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26th Congress,
2d Session.

[SENATE.]

[237]

REPORT

INTENDED TO ILLUSTRATE

A MAP OF THE HYDROGRAPHICAL BASIN

OF THE

UPPER MISSISSIPPI RIVER,

MADE BY

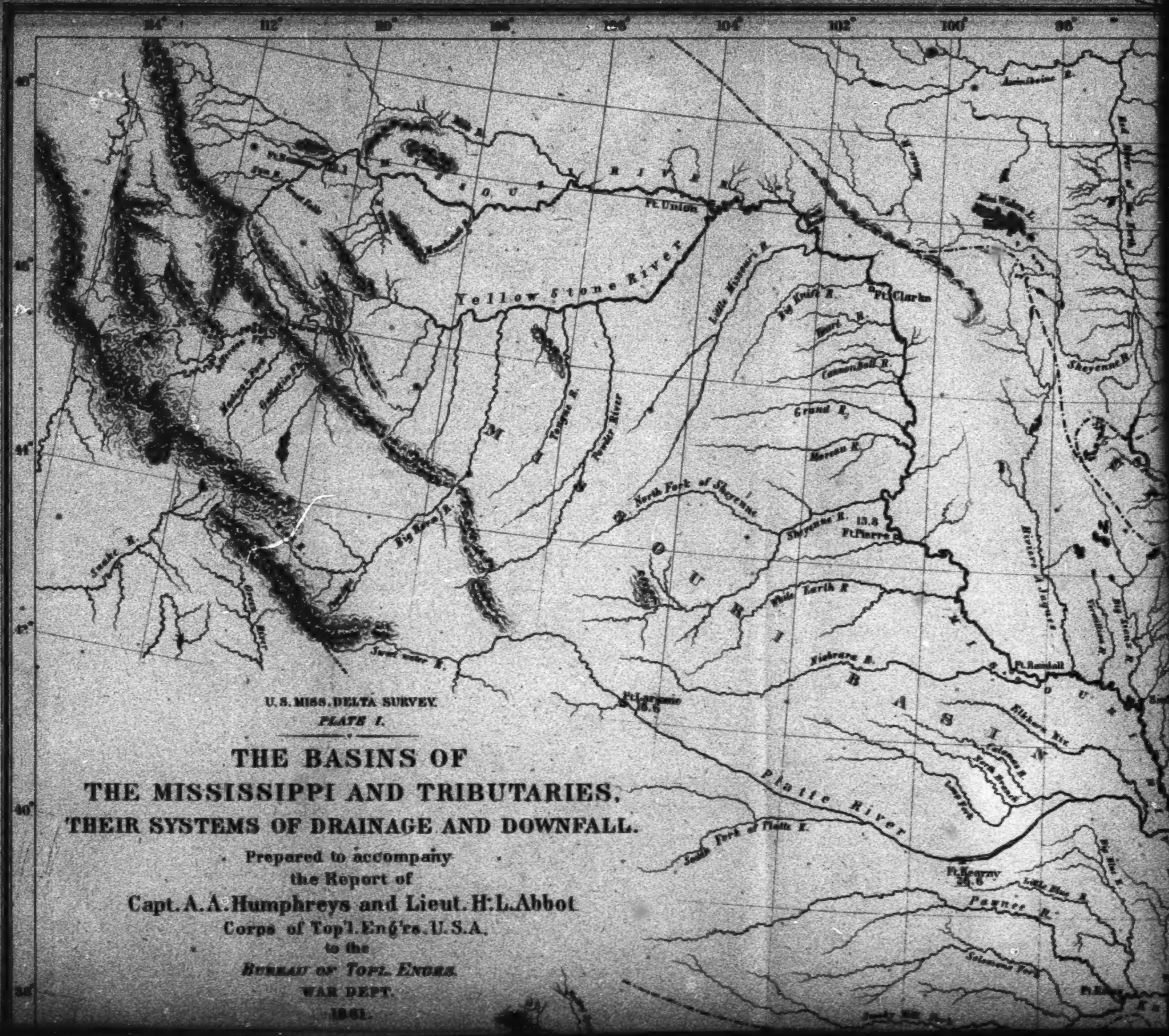
I. N. NICOLLET,

WHILE IN EMPLOY UNDER THE BUREAU OF THE CORPS OF TOPOGRAPHICAL ENGINEERS.

February 16, 1841.

Ordered to be printed, and that 200 additional copies be printed for the Topographical Bureau, and 200 additional copies for the use of the Senate.

WASHINGTON:
BLAIR AND RIVES, PRINTERS.
1843.

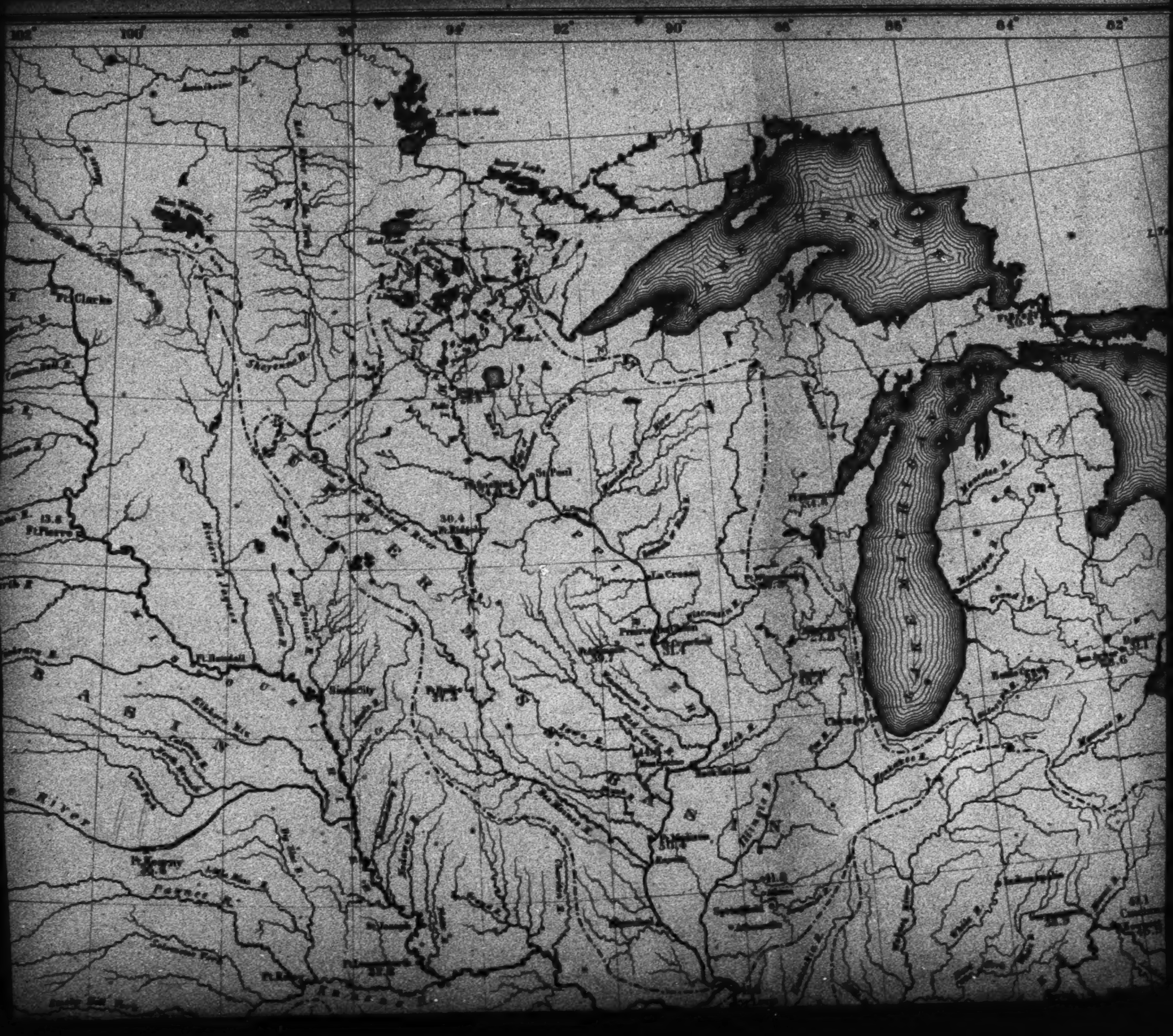


U.S. MISS. DELTA SURVEY.

PLATE I.

THE BASINS OF
THE MISSISSIPPI AND TRIBUTARIES,
THEIR SYSTEMS OF DRAINAGE AND DOWNFALL.

Prepared to accompany
the Report of
Capt. A. A. Humphreys and Lieut. H. L. Abbot
Corps of Top'l. Eng'rs. U.S.A.
to the
BUREAU OF TOP'L. ENGRS.
WAR DEPT.
1861.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Big Sioux R.
Ft. Randall
Sioux City
Elkhorn Riv.
River
Ft. Kearny
Pawnee R.
Ft. Riley
Kansas R.
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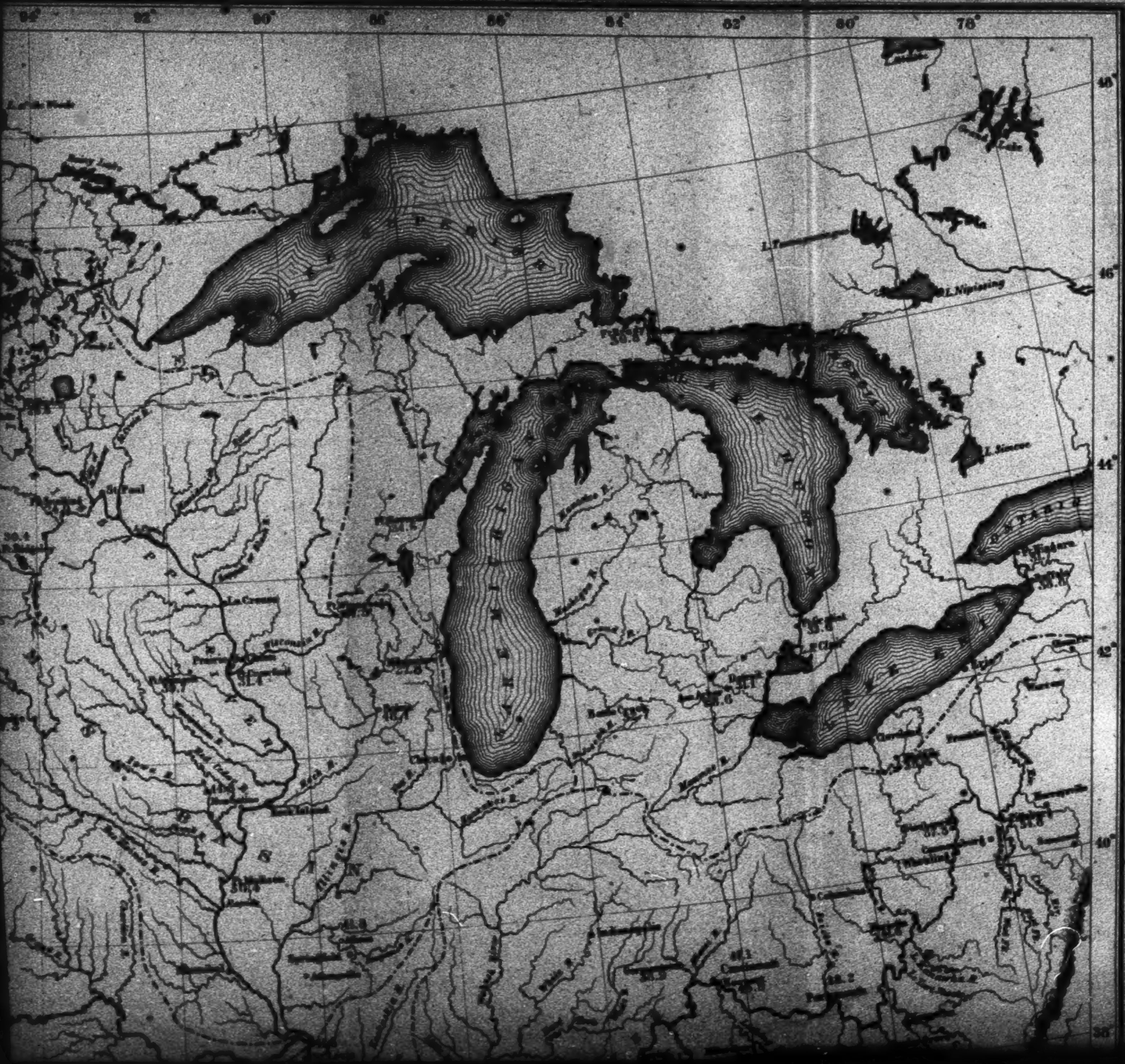
PLATE I.



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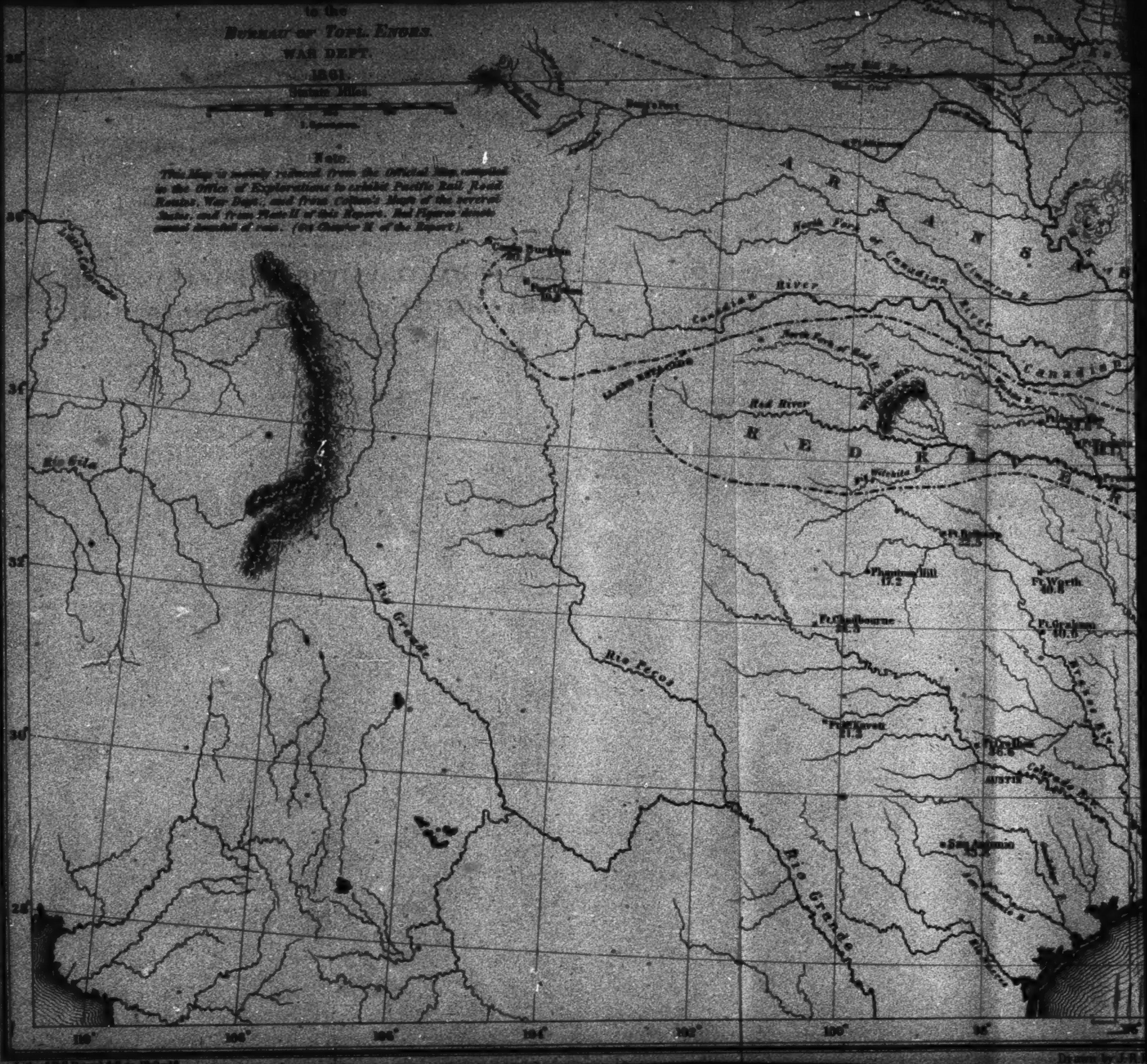


to the

BUREAU OF TOPL. ENGRS.

WAR DEPT.

1861.

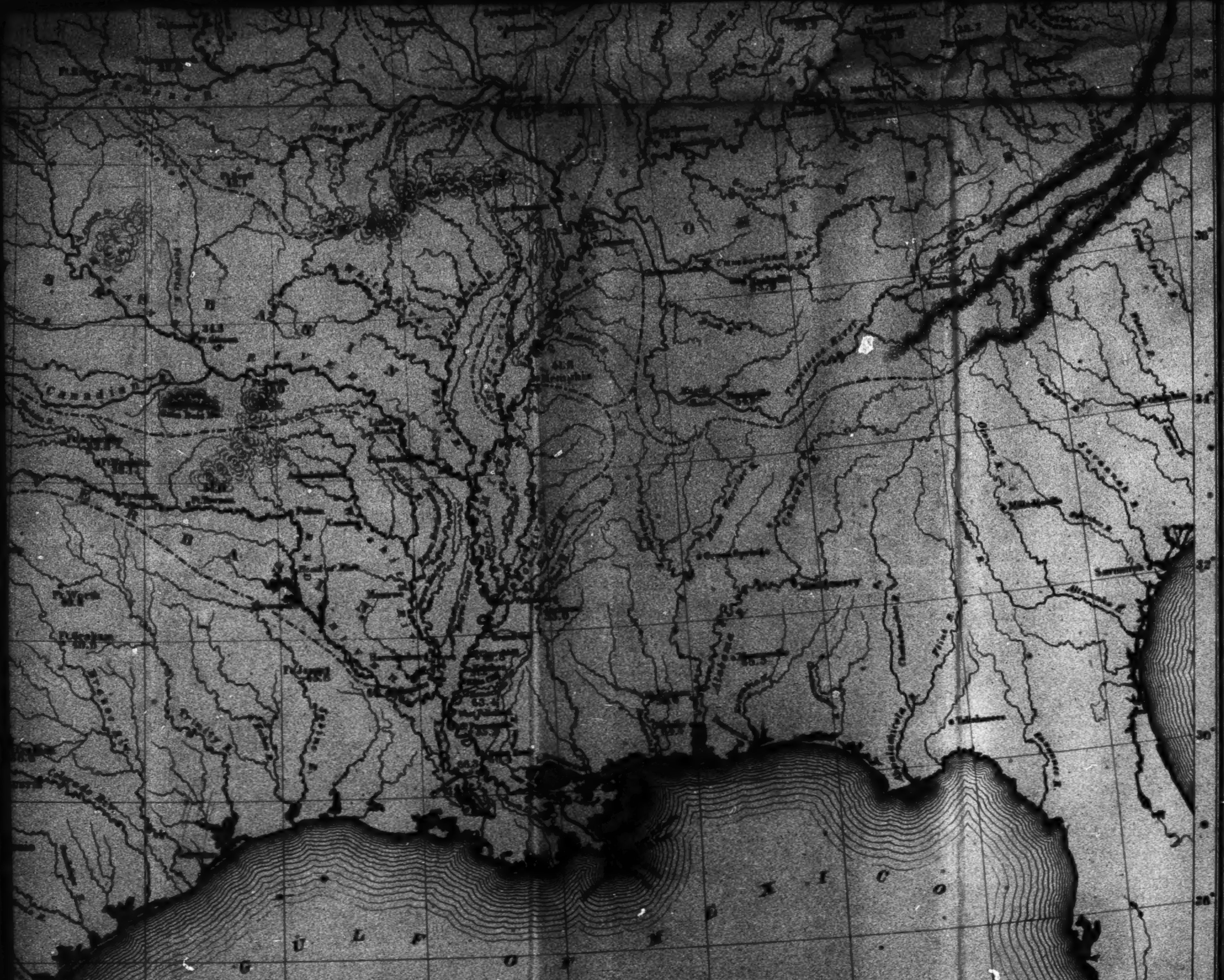
Statute Miles.

Note.

This Map is mainly reduced from the Official Map compiled in the Office of Explorations to exhibit Pacific Rail Road Routes, War Dept., and from Colton's Maps of the several States, and from Plate II of this Report. Red Figures denote annual downfall of rain. (See Chapter II of the Report).

Lith. of P. S. Duval & Son, Philad^a.

Drawn by J. R.



Drawn by J. R. P. Hecklin.

INTRODUCTION.

I trust I may be permitted, by way of introduction, to premise a few words as regards the origin of the map which this report is intended to illustrate, as well as of my connexion with the later expedition that served to complete it.

Having come to this country for the purpose of making a scientific tour, and with the view of contributing to the progressive increase of knowledge in the physical geography of North America, I determined, after having explored the Alleghany range in its various extensions through the Southern States, and having ascended the Red river, Arkansas river, and to a great distance the Missouri river, to undertake the full exploration of the Mississippi river from its mouth to its very sources. During the five years that I was engaged in these excursions, I took occasion to make numerous observations, calculated to lay the foundation of the astronomical and physical geography of a large extent of country, and more especially of the great and interesting region between the Falls of St. Anthony and the sources of the Mississippi. With these labors I connected, also, the study of the customs, habits, manners, and languages of the several Indian nations that occupy this vast region of country.

At the expiration of this long (and, as I found it, arduous) journey, I returned to Baltimore, among my good friends of St. Mary's College, where I soon received a flattering invitation from the War Department and Topographical Bureau to repair to Washington. The results of my travels were made known to these departments; upon which they thought proper to intrust me with the command of an expedition, to enable me to complete, to the greatest advantage, a scheme which I had already projected on my first visit to the Far West—namely, the construction of a geographical and topographical map of the country explored.

To be more explicit, I subjoin a copy of the instructions transmitted to me:

BUREAU OF TOPOGRAPHICAL ENGINEERS,
Washington, April 7, 1838.

SIR: I am authorized by the honorable Secretary of War to inform you that you will be employed to collect additional materials for the map now in hand, of those parts of the United States, and their territories, which lie west of the Mississippi.

As the views of the Secretary have been fully explained to you in the frequent conversations you have had with him on the subject; and as the utmost confidence is reposed in your abilities and industry, further instructions are considered unnecessary.

* * * * * * *

Mr. Fremont will be assigned to you as an assistant.

A copy of your map of the sources of the Mississippi and adjacent regions will be furnished to you; and should the Government, in the end, publish the results which you have collected, and are about collecting, in the form of a map, which is contemplated at present, proper credit will be given to your labors, and you will be allowed the use of the plates, free of charge, for the work you have in contemplation, of the Physical History of the Valley of the Mississippi.

Very respectfully, &c.,
J. J. ABERT,
Lieutenant Colonel Topographical Engineers.

On my return from this expedition, I set about, with the assistance of Lieutenant Fremont and that of Lieutenant Scammond, (of the Corps of Topographical Engineers,) constructing the map; the skeleton of which having been examined by many members of Congress, and its general plan approved of, the Senate of the United States ordered it to be published when finished, under the direction of the Topographical Bureau.

I feel much indebted to Colonel Abert, now chief of the Corps of Topographical Engineers, for the assiduous attention he has paid to the accurate representation by the engraver of the geographical delineations of the map, such as they now appear, and which this report is intended more fully to explain.

The plan which I have adopted for the textual explanation of the map, is the following:

1. To give a succinct account of the physical geography of the country embraced within the limits of the map, including a narrative of the movements of the expedition under my command, during the years of 1838 and 1839; and also an account of my visit to the sources of the Mississippi in 1836.

2. An abstract of the principles and methods by which I have been governed in making my observations, both for astronomical and physical geography.

These two subjects naturally divide the report into two parts; and I have added to it three appendices.

Appendix A presents a tabular view of the geographical positions which have guided me in the construction of the map.

Appendix B is a catalogue of plants, for which I am indebted to that eminent botanist, Dr. James Torrey, to whom I was proud of an opportunity—brought about by the liberal and disinterested intercourse which characterizes American savans, but perhaps more especially the gentleman whom I have now the honor to name—of submitting my collection. The catalogue has been arranged in accordance with the system adopted in the publication of the American Flora, by Drs. Torrey and Grey.

In order to obtain this collection, I engaged, at my own expense, the services of a practical botanist, Mr. Charles Geyer. It does not appear now as complete as it was at one time, owing to the loss of a case containing nearly one-half of my original collection. As it is, I have still reason to believe that it will be no invaluable contribution to the natural history of the American territory. I owe my thanks to Mr. Geyer for the fidelity with which he served me.

Appendix C exhibits a list of fossils, among those of my collection, that belong to some prominent localities indicated in my report. I am far from believing that it is in any way complete; but it may serve to draw the attention of future travellers to the interest connected with the spots that are there designated.

I am indebted to Professor J. T. Ducatel for the translation of Part I of this report; and to my young, intelligent, and laborious friend, John H. Alexander, esq., civil engineer, for that of Part II. For the public this acknowledgment alone is necessary, as the feelings of mutual affection, regard, and esteem, growing out of this intercourse, is a matter between ourselves.

Thus far Mr. Nicollet had written of his introduction, when death put an end to his labors, and before he had been able to revise his report, which had been returned to him for that purpose, and also to add the astronomical observations upon which his calculations were founded. These observations form parts of his journals, which are to be deposited in the Bureau of the Corps of Topographical Engineers.

September 13, 1843.

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SEPTEMBER 13, 1843.

REPORT

OF

I. N. NICOLLET

TO

COLONEL J. J. ABERT, CHIEF OF THE CORPS OF TOPOGRAPHICAL ENGINEERS.

PART I.

PHYSICAL GEOGRAPHY OF THE REGION EMBRACED WITHIN THE MAP.

The most remarkable feature in the physical geography of North America is exhibited in its two systems of mountains; the one to the west, embracing the Mexican Andes, and their prolongation northward, under the name of the Rocky Mountains; the other to the east, known as the Alleghanies, or Apalachian chain. The wide expanse separating these two systems of mountains, is considered as a vast plain that unites, as it were, the Arctic ocean with the Gulf of Mexico. The irregularities of this connecting region, viewed as an extensive whole, are so trifling, in a topographical respect, that it can hardly be said to be diversified by mountains, or even hills. Nevertheless, when examined by sections, it will be found necessary, for the purposes of descriptive geography, to attend to conventional distinctions; so that, without departing from acknowledged principles, I shall be obliged, according to circumstances, to speak of mountains, hills, bluffs, mounds, eminences, plains, plateaux, &c.; using these expressions, however, always in reference to the comparative importance of these irregularities as regards the country under description. Thus the Washita chain, presenting summits that have not more than from 1,000 to 1,200 feet of elevation above the sea, or the champaign country at their bases, have very appropriately received the name of the Washita mountains; whilst the mineral region of Missouri, the swellings of whose surface attain nearly the same elevation in reference to the Mississippi, as the former do to the ocean, are denominated the Missouri hills.

As to the region of country embraced within the limits of my map, its topography differs entirely from that of the two mentioned. It is neither a mountainous, nor a hilly, nor an absolutely flat country; exhibiting undulations of the surface that are not entitled to these usual appellations. There are hillocks, swells, and uplands; but they have a longitudinal and horizontal, rather than a vertical projection. In other words, it is a beautiful arrangement of upland and lowland plains, that give it an aspect *sui generis*. The first Frenchmen who explored it, and the British and Americans who followed them, were so forcibly impressed with this novelty in the appearance of the topography, that they employed new names to designate it. Hence, we have the expressions: *Coteau des Prairies*, *Coteau des Bois*, *Hauteurs des Terres*, and rolling, flat, or marshy *prairies*.

Of course these names are applicable only to certain sections of the country, for neither of them would express its general character; and, in fact, the vast region comprised by my map has no prominent feature by which it could be described as a whole, unless it be some geological traits that cannot be made apparent to every one. And I would particularly insist that the map, as it appears in its published form, ought not to leave an impression upon whoever consulted it, that the country which it is intended to delineate is nothing more than a succession of lakes, marshes, and savannahs. There is still sufficient variety in the irregularities of its surface, and the distribution of the watercourses, woodlands, and prairies, to bestow interest and value upon its several subdivisions, each of which would require a separate description. But this would be rather long, and made tedious by frequent repetitions. Fortunately, however, the task can be simplified, the repetitions avoided, and much time gained, if, previous to entering directly into the subject, I am allowed to say a few words on that geological feature of the country to which I have before alluded.

Erratic deposites.

The region comprised within my map is covered by a species of deposite of the kind for a long time known by the name of *diluvium*, but as this word implies a theoretic idea as regards the accumulation of such deposites, the cause of which is still open to controversy, it is now very generally abandoned, and the designation of *erratic deposites*, among others, adopted in its stead. I have, therefore, used the latter expression, as comprehending a vast deposite of sand, gravel, pebbles, and clays, (arranged in zones, and occupying almost always the bottoms,) and masses of rocks transported to a distance from their original position, usually called *erratic blocks*. This deposite always occurs between the vegetable soil and the rocky strata of all ages that constitute the geological basis of each section of country. To the north and to the south of the western portion of Lake Superior, as far as the upper half of St. Peter's river, it overlies primary rocks; south of the St. Peter's, to the west and east of the Mississippi, it covers silurian rocks; whilst on the Upper Missouri it rests upon a cretaceous formation, everywhere mixing itself with the detritus of the rocks in place. The thickness of this deposite is very variable; sometimes only quite superficial, and, when of a more important character, from 150 to 160 feet in depth. It is met with indifferently with its erratic fragments on the summits of hills, on the upland plateaux, over the plains, and in the valleys. It has contributed towards levelling the original irregularities of the soil, by filling up hollows; or varied them, by transporting over the country new materials; whilst the subsequent action of water and weather has further brought about its characteristic features.

Erratic blocks.

The erratic blocks of this deposite are not generally rounded, but they are still *boulders*. Those which have the rounded appearance, most usual to boulders, among a great many that I had an opportunity of examining, owe it to their exposure to the atmospheric agents which have worn them down. This is made evident by examining those portions of them which are buried in the soil, and in this way pretected; their angles and corners show but little erosion. On the other hand, wherever there is a deposite of pebbles, its origin may be easily traced to local causes that have acted long after the arrival of the *erratic* deposits now under consideration.

It is difficult to determine the direction whence the materials of the erratic *deposits* came. The presumption is, judging from the nature of the erratic *blocks*—the analogues of which are found in higher latitudes—that they were brought from the north to the south.

On the borders of the great lakes, on the flanks of valleys, and where traces of recent floods are apparent, the erratic blocks are in great abundance. Their size varies from a few inches to a few cubic feet; yet this seems to bear no relation to the distance whence they are supposed to have come. On the contrary, it appears that the largest are often found in the highest spots, and at a greater distance from their origin. I did not find them more abundant on the northern slopes of hills than on the southern. Their oryctognostic distinctions are—granitic sienite, resembling the Egyptian red granite; a true sienite, with white feldspar, a granite with a large proportion of feldspar; gneiss; amphibolite; red jasper; quartz pebbles, and a great variety of agates and carnelians. These last are carried off by the streams, and scattered in great numbers over the shores of the Mississippi and Missouri; but they have no value, and are collected by travellers merely as reminiscences. The sand and gravel are composed of the small fragments of all these rocks; the sand, though varying according to places, being principally silicious. It is this sand which constitutes the predominant ingredient in the soils of the whole region embraced in the map, modified according to localities by the presence of carbonate of lime, magnesia, oxide of iron, &c.

I need add nothing more of a general nature as regards the erratic deposite, having introduced an account of it in this place more with the view of its bearing upon the agricultural condition of the country, than to discuss its importance as a geological phenomenon. It may be concluded, from what I have said of it, that there is no region laid down on the map that is to be considered as *desert*. The country is still unknown; there are *solitudes*—that is, uninhabited, but habitable regions.

Coteau des Prairies.

The basin of the Upper Mississippi is separated, in a great part of its extent, from that of the Missouri, by an elevated plain; the appearance of which, seen from the valley of the St. Peter's, or that of the *rivière Jacques, looming as it were a distant shore*, has suggested for it the name of *Coteau des Prairies*. Its more appropriate designation would be that of *plateau*, which means something more than is conveyed to the mind by the expression, *a plain*.

Its northern extremity is in latitude 46°, extending to 43°, after which, it loses its distinctive elevation above the surrounding plains, and passes into rolling prairies. Its length is about two hundred miles, and its general direction N. N. W. and S. S. E. Its northern termination (called *Tête du Coteau*, in consequence of its peculiar configuration) is not more than 15 to 20 miles across; its elevation above the level of the Big Stone Lake is 890 feet, and above the ocean 1,916 feet. Starting from this extremity, (that is, the head of the Coteau,) the surface of the plateau is undulating, forming many dividing ridges which separate the waters flowing into the St. Peter's and the Mississippi from those of the Missouri.

Under the 44th degree of latitude, the breadth of the Coteau is about 40 miles, and its mean elevation is here reduced to 1,450 feet above the sea. Within this space its two slopes are rather abrupt, crowned with verdure, and scolloped by deep ravines thickly shaded with bushes, forming the beds of rivulets that water the subjacent plains.

The Coteau itself is isolated, in the midst of boundless and fertile prairies, extending to the west, to the north, and into the valley of the St. Peter's.

The plain at its northern extremity is a most beautiful tract of land, diversified by hills, dales, woodland, and lakes; the latter abounding in fish. This region of country is probably the most elevated between the Gulf of Mexico and Hudson's Bay. From its summit, proceeding from its western to its eastern limits, grand views are afforded. At its eastern border particularly, the prospect is magnificent beyond description, extending over the immense green turf that forms the basin of the Red river of the North, the forest-capped summits of the *hauteurs des terres* that surround the sources of the Mississippi, the granitic valley of the Upper St. Peter's, and the depressions in which are Lake Travers and the Big Stone Lake. There can be no doubt that in future times this region will be the summer resort of the wealthy of the land.

In attempting a faint description of this beautiful country, my thoughts and feelings are painfully brought back to it. Let me be permitted, as a relief, to transcribe, in connexion with it, a trifling incident.

I owned a white horse, of excellent temper and service—my companion during the whole of my campaign of 1839, and until I reached the upper part of the Coteau des Prairies. Having detailed my assistant (Lieutenant Fremont) to explore one series of lakes, whilst I proceeded to the exploration of another, I loaned my horse to one of my worthy guides (Louison Frenière) who was to accompany Mr. Fremont. This short expedition proved very trying both to men and horses; so that mine sickened, and had to be abandoned. The next day, Frenière went to see the animal. He found him where he had left him, but unable to move. He was compelled to leave him; but, before taking this determination, my half-breed guide took a paper of vermillion, with which he painted the head and other parts of the animal, in recommendation to the *genius loci*, as well as to any Indian that might chance to discover him.

The other portions of the Coteau, ascending from the lower latitudes, present pretty much the same characters. This difference, however, is remarkable: that the woodlands become scarcer, whilst the open prairies increase in extent. It is very rarely only that groves are met with, to which the *Ndakotahs*, or Sioux, have given the name of *Tchan Witah*, or Wood Islands. When these groves are surrounded by water, they assume some resemblance to *oases*; and hence I have assigned this name to some of them on my map.

These *oases*, possessed of a good soil, well wooded, offering an abundance of game, and waters teeming with fish, offer inducements for permanent settlements. In this region, there are frequent instances of a marsh, or lake, furnishing waters to different hydrographical basins—a fact observed by the Sioux, and which they express, in the compound word of their dialect, *mini akipan kaduza;* from *mini*, water; *akipan*, division, share; and *kaduza*, to flow, to run out.

There are, besides, other fine lakes that would furnish, on their borders, eligible sites for such villages as were formerly occupied by some of the *Ndakotah* tribes previous to the war of extermination waged against them by the Sac and Fox Indians. Among them may be numbered the series of lakes designated as the Shetek, Benton, *Titan-kahi*, Poinsett, Abert, Spirit, and *Tusapatenon* lakes.

Whatever people may fix their abode in this region must, necessarily, become agriculturists and shepherds, drawing all their resources from the soil. They must not only raise the usual agricultural products for feeding, as is now but too generally done in some parts of the West, but they will have to turn their attention to other rural occupations—such as tending sheep for their wool; which would greatly add to their resources, as well as finally bring about a more extended application of the industrial arts among them.

Botany. Reverting now to another subject: the future inhabitants of this region, among its most interesting specimens of vegetation, will find, as trees, the American and red elm, lime tree, bur oak, white ash, ash-leaved maple, nettle tree, large American aspen; as shrubs, the hazel, red root, goatswort, &c.; as herbs, alum-root, tufted and American vetch, wood sorrel, sedge and pasture grasses.

The intermediate prairies are characterised by small depressions, filled with rough grasses, and bordered by the Canadian cinquefoil, the germander, southern lily, and button snake-root. Extensive beds of the Virginia strawberry are frequently met with in low places; and in the vicinity of salinas, a species of clover called *buffalo clover*. On the arid slopes is the pink milk vetch, inhabited by millions of Spanish flies. Sandbrakes are generally full of mustard and dwarf amaranths; whilst the stony-grassy borders are fringed with dense bushes of the mimosa tribe and long-leaved willows. Finally, all the high prairies abound with the silver-leaved *psoralia*, which is the prairie turnip of the Americans, the *pomme des prairies* of the Canadians, and furnishes an invaluable food to the Indians.

The plateau of the Coteau des Prairies is composed, in a great measure, of the materials belonging to what I have named the *erratic deposits*, as is evidenced by the nature of its soil, the physiognomy of the ridges and hillocks that diversify its surface, the deep ravines by which it is flanked, and the innumerable *erratic blocks* strewed over the borders of its lakes.

We have no data by which to determine the inferior limits of this deposite; still, there is reason to think that it rests upon such primary rocks as show themselves along the line of rapids of the upper St. Peter's, consisting of granite, sienitic, and other metamorphic rocks. Nevertheless, over the vast extent of this plateau, there is, apparently, but one spot where the subjacent rock makes its appearance—and this is at the Indian Red Pipestone Quarry, so called.

This locality, having acquired some celebrity, may be specially noticed. I shall first describe the route by which I was led to it.

I started from St. Peter's, ascending the river of the same name; and, as the latter has been well described in the narrative of the second expedition of Major Long, and subsequently, with equal accuracy and in more detail, by Mr. G. W. Featherstonhaugh in his "Report of a Geological

Reconnoissance," &c., I need not stop at it. I will only remark, *en passant*, that the distance from St. Peter's to the Traverse des Sioux, being 116 miles, might be opened for steamboat navigation, by removing sundry obstacles that occur at the place called the *Little Rapids*.

The position designated as the *Traverse des Sioux* is destined to become, one day, the most important that presents itself on a distance of 400 miles along the beautiful and fertile valley of the St. Peter's. Its advantages are manifest: it has a good landing; the surrounding soil is excellent, well-wooded, and, from a back ridge of 200 feet in elevation, there is a creek affording a great amount of water-power, easily accessible from the river. From the cotton-wood growing on the alluvial bottoms, I have supplied myself with canoes 33 feet in length.

One mile from the *Traverse des Sioux*, and on the bank of the river, are the remains of an Indian camp, the circular area of which is still indicated by the heaps of stones around each lodge. As this indicates the existence of a custom no longer in use among the *Ndakotahs*, or Sioux, who have occupied the country for a long time back, it is difficult to assign the true origin of this relic. The Sissitons, the fourth tribe of the Ndakotahs, on whose lands these relics are found, have no tradition of them.

The *Traverse des Sioux*, or Sioux crossing-place, is called by the Indians *Oeyuwerah*. There is some ambiguity in the geographical names of places in this vicinity, as laid down in Mr. Featherstonhaugh's report. I shall add a few words, in the hope of removing it.

Opposite the *trading-post* at the Sioux crossings, there is a beautiful semilunar bend, to which the name of Crescent has been applied in Major Long's second expedition. At the commencement of this bend, there is a swamp of the character of such as are called by the Sioux *wiwi*; the waters of which are drained through a small creek that empties into the St. Peter's. Now, the word *wi*, in the Sioux language, signifies a celestial body—an equivalent of the French word *astre*; thus, they say *am-petu-wi*—the orb of day, the sun; *han-yetu-wi*—the orb of night, or the moon. But, according to the genius of the *Ndakotah* tongue, the word *wi* is not considered as the radical of the term *wiwi*. The creek in this vicinity is called Wiwi-Ehanke-Watpadan, viz. creek at the end of the swamp; and yet there is nothing in all this in allusion to the moon.

Another important position is that of *Lac-qui-parle*, where is the residence of the Messrs. Renville, father and son. This will become a stopping-place, and one of recruitment for the growing trade between the West and the British establishment on the Red river of the North.

I may stop awhile to say that the residence of the Renville family, for a number of years back, has offered the only retreat to travellers to be found between St. Peter's and the British posts, in a distance of 700 miles. The liberal and untiring hospitality dispensed by this respectable family, which I have experienced myself, and most gratefully acknowledge on this occasion; the great influence exercised by it over the Indian tribes inhabiting this region of country, in the maintenance of peace, and the protection of travellers, would demand, besides our gratitude, some special acknowledgment, not only on the part of the Government of the United States, but also from the administrators of the Hudson Bay Company.

But to continue our narrative. We left the Sioux crossing-place for the mouth of the *Wara-oju*, or simply the *Waraju;* otherwise, Cottonwood river, the *rivière aux Liards* of the French. During this journey of 26 miles, we visited the Big Swan, or *Marrahtanka* lake, represented by some geographers as no more than a large swamp, mistaking it for some marshy spaces in its vicinity. The truth is, that *Marrahtanka* lake is a beautiful sheet of water about 13 miles long, in the midst of which are several islands sufficiently large to furnish a summer's retreat to the Sissitons, whose most important village is at the mouth of the *Waraju*.

Leaving this village, we proceeded over the elevated prairies that border the river last mentioned, and went on ascending from them to the Coteau des Prairies, in passing through the sources of the Waraju, which we found may be navigable for canoes about two-thirds of its whole length.

Shetek lakes.

Great Oasis.

I pitched my tents, during three days, about the group of Shetek, or Pelican lakes, that occupy a portion of the space forming the plateau of the Coteau des Prairies. This name belongs to the language of the Chippeways, and has been given to them by the voyageurs. The Sioux call this group of lakes *Rabechy*—meaning the place where the pelicans nestle. Their waters are, in a great measure, supplied by a fork from the sources of the Des Moines river. They contain an abundance of fish, and their shores are amply supplied with wood to admit the location of enviable farms. Hence we proceeded to the spot which I have designated on my map as the Great Oasis, and called by the Sioux *Tchan-playe-tanka,* translated by the voyageurs *la grande lisière de bois*—the great skirt of wood. This spot is a forest of limited extent, composed of lime trees, swamp ash, prickly ash, white birch, beaver-wood, white oak, &c., and surrounded by large lakes garnished with aquatic plants, swarming with muskrats, covered, at certain seasons, with wild fowl, and offering a safe protection against the annual firing of the prairies. The usual depth of these lakes is from 7 to 12 feet; and the soil of their borders is found well adapted to the cultivation of the potato, and the growth of culinary vegetables.

The spot which I have just described is an important one in the midst of these solitudes. It was, for a long time, a trading-post depending on the agency at St. Peter's. Mr. J. Laframboise, who accompanied me as a guide and interpreter, and to whom I am indebted for much valuable information obtained during my campaign of 1838, lived there for several years in the capacity of agent for the American Fur Company. But it is no longer an agency, having been suppressed ever since the *Warpetons*, the *Sissitons*, and the *Warpekutes*, forming the second, third, and fourth tribes of the *Ndakotahs*, have become so reduced in number by their wars with the Sac and Fox Indians, and the recent ravages of the small-pox.

In this region of country, now under consideration, the air is remarkably pure and elastic; but the winds are almost constantly high, because nothing interrupts their movements. But the absence of trees preventing the condensation of the atmospheric vapors, springs are very scarce; accordingly, it has been observed that, for days in succession, rain falls at a distance, without ever reaching the open spaces.

After leaving the skirt of woods far behind us, and crossing the open spaces just referred to, we reach the head-waters of the river Des Moines; the principal source of which flows at the bottom of a pretty vale, and forms two small lakes, on the second of which I determined a geographical position.

In these parts may be more particularly observed the evidences of the erratic deposits, presenting themselves in considerable masses on the slope of the valleys, and consisting of fragments of primitive and transition rocks, accumulated in such large quantities that the irregularities in the surface are to be exclusively ascribed to them. Wherever a bend, an angle, or some prominent bluff, is more exposed to the fury of the northwest winds, that blow violently a great part of the year, the soil is torn up and scattered before them, leaving exposed to view its internal structure. This is found to consist principally of fragments of granitic rocks.

The Sioux take advantage of these loose materials to erect signals on the most elevated spots, or to designate the place by some conical structure, where some exhausted hunter has died on the prairies, and desires to be buried in a more prominent situation; or they amuse themselves in shaping them into fantastic figures. They give names to these localities, which thus serve as landmarks in a country where there are no other geographical beacons.

The greatest swell in the undulating surface of the Coteau des Prairies—that which forms the dividing ridge between the waters of the Mississippi and those of the Missouri—has a general direction N. W. and S. E. It is itself a wave in the trough, of which there are several sloughs, one of which furnishes the water of the rivulet between the two lakes, which I have considered as the source of the "Des Moines."

On a S. E. extension of this principal elevation, there is what the Chippeways call a *mushkeg*, and the Sioux *wiwi*, or swamp, or elastic prairie, which is the head-spring of a small river that empties into the River of the Rock, one of the tributaries to the Sioux river. It flows at the bottom of a deep ravine, on the banks of which there is a luxuriant growth of shrubbery; but, as the branches of these do not reach above the heights of the ravine, the Sioux have called it *tchan-na-tam-be;* which literally means hidden wood—*bois caché*. The same wiwi, in rainy seasons, furnishes a small stream which finds its way to the "Des Moines." The name by which it is known to the Sioux is *Okshidanom-witcha-ktepi;* meaning the place where the two young men were killed (by the Sacs.)

Lastly, by way of illustration to what I have said above of the usages of the Sioux, I may add, that, on the western side of the aforesaid wiwi, and on the most elevated crest of the Coteau, there is a great accumulation of the materials belonging to the erratic deposits, of which they have availed themselves to construct the effigy of a man; so that the spot is called *Inyan-witchashta-karapi;* in English, the place where has been built up a man of stone.

We have now arrived in the vicinity of the valley where the Red Pipestone Quarry is found; but, before proceeding to describe it, I will, perhaps, be excused for introducing an incident in the journey that led to it.

On our way, after having reconnoitred distinct marks of a buffalo path, we unexpectedly fell upon a circular breastwork of about 2,000 feet in circumference, and sufficiently elevated to protect the bodies of those who are defending themselves within. The principal entrance is still marked by the places where the chiefs or principal personages of the nation had their lodges, the situation of these always indicating, not only the main access to the camp, but also the direction whence the enemy was advancing. Two miles further on, accordingly, we met with another camp of a similar character. As the system of fortification was on neither side more complicated than just described, it would seem that they had been erected during a long talk, the result of which might lead to a war, whilst the small number of tumuli that are found within the breastwork would seem to imply that both parties remained in presence for some time, though there was no important battle fought.

The Sioux have lost the reminiscences of these camps, and merely conjecture that they were occupied during the settlement of difficulties between the Titons and Yanktons.

Red Pipe-stone Quarry.

But to return to the Red Pipestone Quarry. The Indians of all the surrounding nations make a regular annual pilgrimage to it, unless prevented by their wars or dissensions. The quarry is on the lands of the Sissiton tribe of Sioux.

The idea of the young Indians, who are very fond of the marvellous, is, that it has been opened by the Great Spirit; and that, whenever it is visited by them, they are saluted by lightning and thunder. We may cite, as a coincidence, our own experience in confirmation of this tradition. Short of half a mile from the valley, we were met by a severe thunder-storm, during which the wind blew with so much force as to threaten the overturning of Mr. Renville's wagon; and we were obliged to stop for a few minutes during the short descent into the valley.

If this mode of reception was at first to be interpreted as an indication of anger on the part of the Great Spirit for our intrusion, we may add, that he was soon reconciled to our presence; for the sun soon after made its appearance, drying both the valley and our baggage. The rest of the day was spent in pitching our tent on the supposed consecrated ground, and in admiring the beautiful effects of lights and shadows produced by the western sun as it illumed the several parts of the bluff, composed of red rocks of different shades, extending a league in length, and presenting the appearance of the ruins of some ancient city built of marble and porphyry. The night was calm and temperate, of which we took advantage to make astronomical observations.

The next day after our arrival, we were overtaken by a party of Indians, who had been for many days tracking us at a distance, and whose fires we had mistaken for those of Sacs and Foxes, then at war with the Sioux—one of whom was of our party; in consequence of which, we had been more than usually cautious at our night encampments. They commenced their preparations for visiting the quarry; the usage being among Indians, whenever they are seeking anything useful or indispensable, or when they are about to undertake an enterprise, to prepare themselves by a sort of three days' purification. In the case of supplying themselves with the pipe-stone, he to whom the duty has been assigned of working at the quarry, must abstain from all intercourse with the other sex. They then, in a body, proceed to address prayers and offer presents to the spirit of the quarry. The quarrier is then set to work; but if, perchance, he strikes upon a stratum of the rock unfit to be made into pipes, he is considered an impostor, who has impudently boasted of his purity. He is compelled to retire; and another takes his place, who, of course, selects a more favorable location.

The old Indians assert that the discovery of the red pipestone is due to the annual passage of the buffaloes, which, in following and wearing down their accustomed migratory path, at length reached the bed that contains it.

It may be well imagined how interesting such a discovery must have been to a people who attach so much importance to the pipe, and who were thus furnished with a material bearing their favorite red color, and of a nature to be easily cut and polished.

This buffalo path of discovery is still visible for the whole length of a mile, over which there are evidences that the Indians had extracted specimens long before they were reduced to the necessity of quarrying, according to their unskilful methods, the main bed. Hence, for several years past they have expressed regret at the difficulty of obtaining it. To reach it now, it is necessary to blast a superincumbent stratum of quarzite four and a half feet thick, which could not have been effected with their limited means; so that they were delighted to see us coming in this particular to their assistance. I set my men at work upon it; and in three days the quarry was opened and disencumbered. In the mean time, I took advantage of every favorable occasion to continue my astronomical observations, and to vaccinate the Indians who had joined our party.

Valley of the Red Pipestone.

The valley of the "Red Pipestone" extends from N. N. W. to S. S. E. in the form of an ellipsis; being about three miles in length, with a breadth at its smaller axis of half a mile. It is cradle-shaped, and its slope to the east is a smooth sward, without trees and without rocks. Its slope to the west is rugged, presenting a surface of rocks throughout its whole length, that form a very picturesque appearance, and would deserve a special description if this were the place to do so. But I am now more particularly interested in defining its geological features.

The principal rock that strikes the attention of the observer in this remarkable inland bluff, is an indurated (metamorphic) sand rock or quarzite, the red color of which diminishes in intensity from the base to the summit. It is distinctly stratified; the upper beds being very much weather-worn and disintegrated into large and small cubic fragments.

The whole thickness of this quarzite, which immediately overlies the bed of the red pipestone, is 26½ feet. Its strata appear to have a small dip to the N. E. The floor of the valley, which is higher than the red pipestone, is formed by the inferior strata of the quarzite, and in the spring of the year is most generally under water, the action of which upon the rock is apparent in the great quantity of fragments strewed over the valley, so as to render it uncomfortable to walk over them. The creek by which the valley is drained, feeds in its course three distinct small basins at different elevations, that penetrate down as far as the red pipestone.

This red pipestone, not more interesting to the Indian than it is to the man of science, by its unique character, deserves a particular description. In the quarry of it which I had opened, the thickness of the bed is one foot and a half, the upper portion of which separates in thin slabs, whilst the lower ones are more compact. As a mineralogical species, it may be described as follows: compact; structure slaty; receiving a dull polish; having a red streak; color blood red, with dots of a fainter shade of the same color; fracture rough; sectile; feel somewhat greasy; hardness not yielding to the nail; not scratched by selenite, but easily by calcareous spar; specific gravity 2.90. The acids have no action upon it; before the blow-pipe it is infusible *per se*, but with borax gives a green glass.

According to Professor Jackson, of Boston, who has analysed it, and applied to it the name of catlinite, after Mr Catlin, it is composed of

Water - - - - - -	8.4
Silica - - - - - -	48.2
Alumina - - - - - -	28.2
Magnesia - - - - - -	6.0
Peroxide of iron - - - - -	5.0
Oxide of manganese - - - - -	0.6
Carbonate of lime - - - - -	2.6
Loss (probably magnesia) - - - -	1.0
	100

But Professor Jackson assimilates it to the *agalmatolite*, from which it differs, however, very materially by its general aspect, its conduct before the blow-pipe, and its total insolubility in sulphuric acid.*

Another feature of the Red Pipestone valley is the occurrence of granitic boulders of larger size than any I had previously met. One of them measured about 60 feet in circumference, and was from 10 to 12 feet thick. They are strewed over the valley, in which it is remarkable that there are no pebbles.

I shall now proceed to give a short account of some of the regions of country adjoining the Coteau des Prairies, omitting those which have already found a place in the geography of the United States, so as to be more particular concerning such as are but little or not at all known.

Among these, that which appeared to me the most favorable, is the one watered by the Bold Mankato, or Blue Earth river, and to which I have given the name of *Undine Region*.

Undine region.

The great number of the navigable tributaries of the Mankato, spreading themselves out in the shape of a fan; the group of lakes surrounded by well-wooded hills; some wide-spreading prairies with a fertile soil; others apparently less favored, but open to improvement;—the whole together bestow upon this region a most picturesque appearance. It was while on a visit to lakes *Okamanpidan* and *Tchanhassan*, (Little Heron and Maple-wood lakes,) that it occurred to me to give it the name I have adopted, derived from that of an interesting and romantic German tale, the heroine of which belonged to the extensive race of water-spirits living in the brooks, and rivers, and lakes, whose father was a mighty prince. She was moreover the niece of a great brook (the Mankato) who lived in the midst of forests, and was beloved by all the many great streams of the surrounding country, &c., &c.

I do not know why I fancied an analogy between the ideal country described in the tale, and that of the one before me; but I involuntarily, as it were, adopted the name.

The limit of this region is the N. E. prong of the Coteau des Prairies, which takes in the sources of the Mankato and of the La Hontan rivers, subdividing itself into undulations whence proceed the waters of the *Wazi-oju*, or Pine river, *Miniska*, or White Water river, *Okah*, or Heron river, *&c.*, *&c.*; all emptying into the Mississippi.

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* The red pipestone is also found on the upper part of the Mishkwagokag, or Red Cedar river, which falls into the Chippeway river, that empties itself into the Mississippi below Lake Pepin.

The Mankato becomes navigable with boats within a few miles of its sources. It is deep, with a moderate current along a great portion of its course, but becomes very rapid on its approach to the St. Peter's. Its bed is narrowly walled up by banks rising to an elevation of from 60 to 80 feet, and reaching up to the uplands through which the river flows. These banks are frequently cliffs, or vertical escarpments—such as the one called by the Sioux *Manya-kichaksa*, or cleft elevation. The breadth of the river is pretty uniformly from 80 to 120 feet wide; and the average breadth of the valley through which it flows scarcely a quarter of a mile. The latter, as well as the high grounds, are well wooded; the timber beginning to spread out on both shores, especially since they have become less frequented by the Sioux hunters, and are not so often fired. But the crossings of the river are hard to find, requiring to be pointed out by an experienced guide. I have laid down on the map my route over the Undine Region, and the geographical positions of the *crossing-places* will be found in the table at the end of the report.

Indian blue earth.

On the left bank of the Mankato, six miles from its mouth, in a rocky bluff composed of sandstone and limestone, are found cavities in which the famed blue or green earth, used by the Sioux as their principal pigment, is obtained. This material is nearly exhausted, and it is not likely that this is the spot where a Mr. Lesueur (who is mentioned in the Narrative of Major Long's Second Expedition, as also by Mr. Featherstonhaugh) could, in his third voyage during the year 1700, have collected his four thousand pounds of copper-earth sent by him to France. I have reason to believe that Lesueur's location is on the river to which I have affixed his name, and which empties into the Mankato three-quarters of a league above Fort L'Huillier, built by him, and where he spent a winter.

This location corresponds precisely with that given by Charlevoix, whilst it is totally inapplicable to the former. Here the blue earth is abundant in the steep and elevated hills at the mouth of this river, which hills form a broken country on the right side of the Mankato. Mr. Fremont and myself have verified this fact: he, during his visit to Lesueur river, and I, upon the locality designated by Mr. Featherstonhaugh, where the Ndakotahs formerly assembled in great numbers to collect it; but to which they now seldom resort, as it is comparatively scarce—at least so I was informed by *Sleepy-eye*, the chief of the *Sissitons*, who accompanied me during this excursion.

As I did in the case of the red pipestone described above, I will state the mineralogical characters of the Indian blue earth, or clay. It is massive, somewhat plastic, emits an argillaceous odor when breathed upon;—color, bluish green; easily scratched with the nail when formed into hardened balls. The acids have no action upon it; it is infusible before the blowpipe, but loses its color and becomes brown. This color is due to the peroxide of iron, which it contains in the proportion of ten per cent. at least. It contains no potash, and but a small proportion of lime. It is a very different mineral from that described by Dr. Thompson, under the name of pipe-clay.

Bois-francs.

Next comes the region of country between the St. Peter's and the upper portions of La Hontan and Lesueur rivers, above referred to. This is an extensive district, thickly set in forests, amidst which there are reported to be many large lakes.

The French give to the forests the name of *Bois-francs*, or *Bois-forts*, whenever they are not composed principally of trees belonging to the family of the *coniferæ*.

To complete an account of the physical geography of the country, including Undine Region with the last mentioned, I will now enumerate some of the most important trees, shrubs, and plants, that characterize its *sylva* and *flora*.

Botany of Undine Region.

The whole country embraced by the Lower St. Peter's and the Undine Region exceeds any land of the Mississippi above Wisconsin river, as well in the quality and quantity of its timber as the fertility of its soil. The forests of the valley on the right bank are connected by groves and small wooded streams of the adjoining prairies with the forest called Bois-francs; and they extend so far southwest, as to include the lands of the upper waters of the Mankato river.

The forest trees, as reported to me by Mr. Geyer, are chiefly soft maple, American and red elm, black walnut, the nettle tree, bass wood, red and white ash; the undergrowth, the common hawthorn, prickly ash, high cranberry, red root, gray dogwood, fox grapes, horse briar, and moonseed. Among the herbs, are the wild and bristly sarsaparilla, Indian turnip, the gay orchis, and others; rushes and the flowering ferns are abundant along the low banks of the rivers. The valley prairies are rich in pasture grasses and leguminous and orchideous plants, such as the yellow ladies' slipper, American and tufted vetch, and others. The lowest parts near the borders of the woods, and those subject to inundations, are filled with the high weeds common to such places—as the ragged cup, tall thistle, great bitter-weed, the tuberous sunflower, and others.

Swamps are frequent, and some of them contain extensive tracts of tamarack pines. Cedars grow intermixed with red birch on the rocky declivities of the Lower Mankato river. Red and bar oak, with hazel, red root, peterswort, and the wild rose, are the trees and shrubs of the uplands. There are, besides, thickets of poplar-birch, that are frequent in the elevated prairies near the river. The prairies are very luxuriant, and generally somewhat level and depressed; the gum plant and button snake-root are their most abundant and conspicuous herbs.

To give animation to the Undine Region and to the valley of the St. Peter's, as well as to develop trade between the British possessions, the Territory of Iowa, and the State of Missouri, it would be necessary for Government to open routes of communication between St. Peter's and the Traverse des Sioux, through the Bois-francs mentioned above; between St. Peter's and the Prairie du Chien; between Dubuque and the Lac-qui-parle; through the Undine Region, with a fork in the direction of the Traverse des Sioux, passing by Fremont and *Okoman* lakes, (which latter is at the head-waters of La Hontan river,) and in other directions that would naturally suggest themselves.

The geological formation that characterizes the Undine Region, as well as the St. Peter's, as far nearly as the mouth of the *Waraju*, is the same as that of Fort Snelling, which I shall describe further on. It consists mainly in a thick stratum of friable sandstone as the basis, succeeded by a deposite of limestone, which is sometimes magnesian, and occasionally contains fossils; the whole covered by what I have called the erratic deposite.

The sandstone forms the Little Rapids of the St. Peter's, and, reappearing at the Traverse des Sioux, determines other rapids that are observed in a beautiful stream two miles N. E. of the trading-post in this place. At other intermediate localities, the sandstone and limestone both appear, but further on, the limestone disappears altogether, because it goes thinning out as the western limits of the formation are approached. This may be observed near the *Waraju*, and towards the upper parts of the Mankato, where the limestone, and indeed the sandstone, are replaced by beds of clay or of calcareous marl.

Mineralogy.

In the argillaceous deposites last referred to, there are red ochre, other ferruginous minerals and lignites. Between the sandstone and the limestone there is a bed of whitish clay, enclosing nodules of the blue earth; and sometimes, between the strata of limestone, bands of argillaceous iron ore, intermixed with siliceous and calcareous incrustations.

The account given above applies equally to the rocky cliffs on the upper part of the La Hontan river, and especially to the interesting locality at the entrance of its south fork, which is four miles to the east of Lake *Ti-tanka-tanninan.*

La Hontan river.

Those who have read the travels of Baron de la Hontan, in which he mentions his discovery of a certain long river coming from the west, and falling into the Mississippi, may, perhaps, think that, by giving his name to a river upon my map, I meant to clear up the doubt which has existed, for more than 150 years, as regards the veracity of this officer.

Such was not originally my intention; but I am forced into it after terminating my exploration of the Undine Region. Having afterwards procured a copy of La Hontan's book, in which there is a roughly-made map of his long river, I was struck with the resemblance of its course, as laid down, with that of Cannon river, which I had previously sketched in my own field-book. I soon convinced myself that the principal statements of the Baron in reference to the country, and the few details he gives of the physical character of the river, coincided remarkably with what I had laid down as belonging to Cannon river.

Thus the lakes and swamps corresponded; traces of Indian villages mentioned by him might be found in the growth of a certain grass that propagates itself around all old Indian settlements. Some of the names which he assigns to them may be referred to dialects of the Sioux tongue; and even his account of the feasting of his men on the large number of the American hare which he found there, is substantiated by the voyageurs.

His account, too, of the mouth of the river is particularly accurate. The most scrupulous geographer, describing it at this time, would have but little to alter. As this locality is in the way of travellers going to St. Peter's, I will quote from the text of La Hontan, so that they may judge of the truth of my assertion.

"We entered (he says) the mouth of this long river, which is a sort of large lake filled with cane-brakes (*joncs;*) in the midst of which we discovered a narrow channel, which we followed up," &c.

I do not pretend, however, to justify his gross exaggeration of the length of the river; of the numerous population on its banks; and his pretended information respecting the nations inhabiting the more remote regions. This sort of exaggeration appears to have belonged to the period; but there is, apparently, a more serious objection to be made to his narrative—namely, that it appears, from his text, he travelled during the months of November and December; at which period of the year the rivers in these parts are most usually frozen, and the voyage, therefore, impracticable. But the received opinion, on the other hand, is, that it is one of the last to freeze, and is the last resort of the wild fowl. The Sioux are said to congregate, in consequence, upon its banks in large numbers; relying on this resource, whilst they are otherwise collecting their peltries, insomuch that the American Fur Department at St. Peter's has always kept up this post for the purpose of securing the advantages of this trade. Besides, this river is fed by a great number of springs; and the upper portion of its course is, in a remarkable manner, protected from sudden changes of temperature by high rocky banks, and thick forests that cover them.

Under all circumstances, I have thought proper to notice these facts, that seem to possess sufficient interest in the history of the geography of the West. I have stated what appeared to me the true facts in the case; and I may add, in conclusion, that, if La Hontan's claims to discoveries are mere fables, he has had the good fortune or the sagacity to have come near the truth.

Further, in reference to La Hontan river. When the French were in possession of the country, it was known by the name of "*Rivière aux Canots*," or Canoe river; as it was there that the traders were in the habit of concealing their canoes. Its present name of Cannon river is evidently a corruption of the French one. The one which it bore among the Sioux in 1700, when Le Sueur ascended the Mississippi, (and which it still bears,) was *Inyan-bosndata*, or Standing Rock.

Natural obelisk.

This Indian name (*Inyan-bosndata*) is that of a natural obelisk, which occurs on a low and sandy plain four miles to the north of the crossing-place, on the "north fork of La Hontan river." This heap of disintegrated sandstone rock is 36 feet high. It is a curious specimen of the weathering of the sandstone of the West, that may be compared to the earth pillars left behind by workmen to mark the extent of their excavations, and is possibly a relic of the thickness of the formation previous to the devastating agency of the elements that has altered the original level of the surface of the country. My friend, the Viscomte de Montmort, (then an attaché to the French legation at Washington, who accompanied me in this excursion,) has furnished me with an admirable drawing of it, as well as of the natural monument next to be mentioned.

Castle Hill.

Twelve miles north of the natural obelisk which I have just described, near the crossing-place of the Vermillion river, there are other evidences of the great denudation of the surface that has taken place in this region. One of them is also remarkable by its symmetrical outlines, bearing the appearance of a dilapidated castle of feudal times—such as are seen in the Alps and other places; hence its name. I have thought it of sufficient importance to indicate their situations on my map. These natural monuments are mentioned by Mr. Featherstonhaugh upon information received from others; but he did not visit them.

The other regions of country that I might allude to in this place having been generally well described in the reports of geological surveys made by D. D. Owen, M. D., and Dr. John Locke, and in other publications concerning the settled portions of the Iowa Territory, and of the northern districts of the State of Missouri, I shall confine myself to an account of some of the most important rivers that merit a conspicuous place in the geography of the United States.

Iowa and Red Cedar rivers.

Iowa river, several miles before it enters the Mississippi, has been mainly supplied by two branches of unequal length and importance. The eastern branch (which is the longer of the two) is called Red Cedar river; and its head-waters are not far from those of the La Hontan. It so happens, contrary to the received principles of descriptive geography, that Red Cedar river loses its name after emptying into the shorter branch, which maintains that of the Iowa. It is true, that these names were established before it was known which of the two was the more important. To Albert C. Lea, esq., must be assigned the credit of having first laid down the course of Red Cedar river, the whole length of which is not less than 350 miles, and which is probably navigable for 160 miles out of these. After quitting the sandy plains mentioned above, it pours rapidly over a series of ledges of the carboniferous limestone, until it reaches a much lower level, where it deposites many sand-bars, the soil of which is congenial to a vigorous growth of the red cedar; whence the river derives its name.

Des Moines river.

The Des Moines is one of the most beautiful and important tributaries of the Mississippi north of the Missouri; and the metamorphosis which its name has undergone, from its original appellation, is curious enough to be recorded.

We are informed that Father Marquette and Mr. Joliet, during their voyage in search of the Mississippi, having reached the distance of sixty leagues below the mouth of the Wisconsin, observed the footsteps of men on the right side of the great river, which served as a guide for these two celebrated explorers to the discovery of an Indian trail, or path, leading to an extensive prairie, and which they determined to follow. Having proceeded about two leagues, they saw first one village on the bank of a river, and then two others upon a slope, half a league off from the first. The travellers, having halted within hailing distance, were met by the Indians, who offered them their hospitalities, and represented themselves as belonging to the Illinois nation. The name which they gave to their settlement was *Mouin-gouinas*, (or *Moingona*, as laid down in the ancient maps of the country,) and is a corruption of the Algonkin word *Mikonang*, signifying *at the road;* the Indians, by their customary elliptical manner of designating localities, alluding, in this instance, to the well-known road in this section of country, which they used to follow as a communication between the head of the lower rapids and their settlement on the river that empties itself into the Mississippi, so as to avoid the rapids; and this is still the practice of the present inhabitants of the country.

Now, after the French had established themselves on the Mississippi, they adopted this name; but with their custom (to this day, that of the Creoles) of only pronouncing the first syllable, and applying it to the river, as well as to the Indians who dwelt upon it; so that they would say "*la rivière des Moins*"—"the river of the Moins;" "*aller chez les Moins*" —to go to the Moins (people.) But, in later times, the inhabitants sesociated this name with that of the Trappist Monks (*Moines de la Trappe*) who resided on the Indian mounds of the American bottom. It was then concluded that the true reading of the *rivière des Moins* was the "*rivière des Moines*," or river of the monks, by which name it is designated on all the modern maps.

The Des Moines empties into the Mississippi in 40° 22' lat. N.; and its sources, heretofore supposed to be in 43°, are extended on my map to 44° 3' N. It is fed from the beautiful group of lakes, previously described as the *Shetek* lakes, towards the middle of the plateau of the Coteau des Prairies, at an elevation of 1,580 feet above the level of the sea. The waters of these lakes flow from N. W. to S. E., swelling themselves by innumerable tributaries until they enter the Mississippi at an elevation of about 444 feet above the Gulf of Mexico.

The course of the Des Moines cannot be less than 400 miles; whence it would follow that the average of its descent is nearly three feet to the mile, with a current approaching in velocity that of the Missouri. The river flows constantly in a deep valley, from its sources to within a few miles of its confluence with the Mississippi, where it spreads over low grounds. In its upper part, its bed is upon sand, rolled pebbles, and shingle, (*gallets.*)

Like most of the rivers in this region, it has its sources in lakes and swampy grounds, and has a tortuous and sluggish course until it reaches a greater declivity about 43° of latitude, where it becomes much more rapid and direct, and frequently pitches impetuously over rocky beds of carboniferous limestone forming frequent bluffs on alternate sides. This rock, which might furnish an abundance of excellent building materials, is overlaid in some places by deposites of coal. Penned up, as it were, between the valleys of the Mississippi and the Missouri, and those of their adjacent tributary streams, the Des Moines has no large tributary of its own. Flowing through a wide and deep valley, the principal waters which it receives are the drainings through deep and long ravines, intersecting its shores and rendering the travel along them inconvenient and painful. The only tributary streams of any consequence, are Racoon Fork, and perhaps Lizard and Cedar rivers, on the right side; Boone's river and Moingonan's Brother, on the left. Yet, in the spring of the year, the Des Moines may be navigated by flat-boats that would carry the produce of the upper country to the head of steamboat navigation, which may be one hundred and fifty miles from its mouth. But, as my assistant, Lieut. Fremont, has made the surveys to ascertain the spot to which steamboats of different burdens may ascend from the Mississippi, I refer to his report for more ample details.

The Sioux or *Ndakotah* Indians, call the Des Moines *Inyan-sha-sha-watpa*, or Redstone river, from *inyan*, stone; *sha-sha*, reduplication of *sha*, red; and *watpa*, river. They call the upper east fork *Inyan-sha-sha-watpa-sunkaku*, the brother of Redstone river. This is the tributary which I have precedingly called Moingonan's Brother.

The union of the Moingonan with its brother forms what is also called the upper fork, which is in the midst of a fine grove, embracing an area of several miles, affording good soil and water-power. This grove will soon be the centre of a populous settlement.

Whilst writing these pages, I am informed that all the lands on the Moingonan and its tributaries, below this point, have been purchased from the Sac and Fox Indians, who continue their destined westward progress, closely followed by the white man, eager to possess so beautiful a country.

The hydrographical relations of the Des Moines with the Mankato, St. Peter's, and Mississippi rivers, present a geographical incident of some interest. By referring to the map, in lat. 43° 48', long. 95° 12', it will be seen that there is a lake very near the Des Moines named *Tchan-shetcha*, or Dry Wood lake. The *Watonwan* river, which is a tributary to the Mankato, that empties itself in the St. Peter's, has its source in this lake. Now the tongue of land separating the Des Moines from *Tchan-shetcha* lake, is not more than a mile to a mile and a half broad; so that, were a canal cut across, the waters of the Des Moines would be made to communicate with those of the St. Peter's.

The importance of this communication may be made sensible by a knowledge of the fact, that the Indian traders dependent on the American Fur Company have frequently spent the winter at the head-waters of the Des Moines. On one occasion, Mr. Joseph Laframboise, failing in his means of transportation by land, had a large canoe built, which he loaded with his peltries, took water upon the *Tchan-shetcha*, descended the *Watonwan* and the *Mankato*, and arrived safely at the St. Peter's station. I mean only to indicate at present, however, what will at a future day form an obvious feature in the system of internal improvement of these regions, so new in the geography of the United States, by which this extensive and beautiful territory might be rendered circumnavigable. I hasten to get back to the Mississippi.

Lower or Des Moines Rapids.

The Lower or *Des Moines Rapids*, on ascending the Mississippi, are two hundred and four miles above St. Louis, and beyond the mouth of the Des Moines, whence they derive their name, which was given to them by the first French settlers who opened the fur-trade in this part of the Mississippi long before it was known that the Des Moines had any places in its course that could be considered as rapids.

The spot at which the first difficulties in the navigation of the rapids are encountered, is about three quarters of a mile beyond Keokuk, and four miles above the mouth of the Des Moines; thence the rapids ascend nearly up to Montrose, where, but a few years back, was situated Fort des Moines, and opposite to which is Commerce, which has but lately changed its name to Nauvoo, and has become a Mormon settlement.

In January, 1838, Congress ordered a survey of the rapids, which was intrusted to Captain R. E. Lee, of the corps of engineers. By his estimate, the length of the rapids is eleven miles, with a fall of twenty-four (24) feet. Here the Mississippi tumbles over ledges of a blue limestone, at all times covered with more or less water, and through which many crooked channels have been worn by the action of the current. During low stages of the water, the passage of the rapids is very difficult, as well in consequence of the shallowness of the water as the narrowness and tortuousness of the channel; so that the time of practicable steamboat navigation is shortened by nearly three months in the year, which is about the duration of low water in the river.

Captain Lee had commenced a system of improvements, that has, unfortunately, been suspended, to the great detriment of the country; for, without the completion of such improvements as had been so judiciously devised and commenced, the immense resources of the beautiful region of country north of the rapids, in Illinois, Wisconsin, and Iowa, will remain unavailable. In the winter of 1836–'37, I was a witness that $15 were paid for flour, and $25 for barrelled pork, at St. Peter's, which at St. Louis had probably respectively cost but $5 and $8, because the steamers loaded with winter provision had not been able to cross the rapids during the preceding fall.

Geology.

The uplands that border on the rapids are based upon the mountain or carboniferous limestone, as the contained fossils indicate. The limestone, of a dirty color, and much broken up, is the matrix of numerous siliceous and calcareous geodes. Those fine geodes picked up by all travellers, are found on the banks of the rapids, having fallen from the adjoining bluffs. Within a few years there has been a road opened leading to Warsaw, and, being cut along the bluff, has exposed to view the stratum in which the geodes occur, and their position therein. They are observed to be slightly compressed, their greater axes being parallel to the stratification of the limestone, which is horizontal. As I have collected a number of them, I shall describe mineralogically a few of those that have appeared to me the most interesting in their mineral associations, viz:

1. Siliceous geodes, the cavity of which is filled with prismatic crystals of limpid quartz, *(quarz hyalin.)*
2. Siliceous geodes, filled with crystalline quartz, the pyramidical terminations of which are of a red color.
3. Siliceous geodes, filled with crystallized calcareous spar, (variety, *en tête de clou* of *Haüy.*)
4. Silico-calcareous geodes, with rhombic calcareous spar.
5. Silico-calcareous geodes, with confusedly crystallized calcareous spar.
6. Siliceous geodes, enclosing calcareous spar and crystalline sulphuret of zinc.
7. Siliceous geodes, containing mamelonated calcedony, of a red color.

These geodes vary in size from four or five inches in diameter to twelve or fifteen.

Warsaw.

Warsaw is situated directly opposite the mouth of the Des Moines, partly at the foot, partly on the top of the bluff that overlooks the Mississippi. This is a very advantageous position, as it forms a natural depôt for the products of the back parts of Illinois and those descending the Des Moines. Moreover, it is at Warsaw that the steamboats that cannot cross the rapids stop, to discharge their cargoes into keel-boats that transfer them to the steamers, at the head of the rapids; the same keel-boats bringing, in return, freight for the steamboats on the descending trade.

Between the lower and upper rapids, a distance of about one hundred and thirty miles, the navigation of the Mississippi is perfectly safe. Its valley swells out considerably, especially about the confluence of the larger rivers coming from the N. W.; the entrances to which are concealed by a number of low islands and sloughs, that, at some seasons, affect the salubrity of the surrounding country. Occasionally, however, the highlands approach the river, and emigrants take advantage of such positions to multiply the sites of new villages and towns.

Burlington.

Burlington is one of these newly-built-up towns, beautifully situated on the west bank of the Mississippi, along the slope of a bluff extending northerly to the Flint river. It deserves a passing notice, by way of connecting the geology of the lower rapids with that of the Upper Mississippi.

The following section exhibits the several subdivisions according to mineralogical and oryctognostical distinctions of character at Burlington, and in the descending order:

1.	Superficial soil	25 feet
2.	Chert	2 "
3.	Yellow limestone with spatic *encrinites* and *productæ*	10 "
4.	Calcareous argillaceous marl with few fossils	3 "
5.	Siliceous limestone	2 "
6.	Oolitic limestone with *productæ*	2 "
7.	Bluish clay	3 "
8.	Yellow compact limestone	3 "
9.	Compact siliceous limestone with veins of calcareous spar	8 "
10.	Oolitic limestone	½ "
11.	Saccharoidal blue limestone with veins of calcareous spar and impressions of small *orthis* and *strophomena*	½ "

NOTE.—The stratum of the lower portion, which descends to the level of the Mississippi, and which could not be observed, is about 50 feet.

Upper or Rock River Rapids.

Upper or *Rock River Rapids*, so named from their proximity to Rock river, above the mouth of which they are. On approaching these rapids, in the ascent of the Mississippi, there is presented to the view as beautiful a prospect as can be met with in the whole West.

Rock island comes into view covered with a most luxuriant vegetation, and made picturesque by the ruins of an old fort; whilst the town of Stephenson, and that of Davenport, with the beautiful range of sloping hills in the rear of it, help to form so winning a landscape, as alone to account for the rapidity with which settlements multiply in this portion of the Mississippi. Other more substantial inducements, however, are offered to the immigrant in the fertile lands, that extend to a considerable distance back on both shores of the river.

The length of the rapids is from fourteen to fifteen miles from Rock island to a little below Port Byron, on the left side of the river, and Parkhurst on the right side. According to the surveys of Captain R. E. Lee, the fall of the Mississippi, from the head to the foot of the rapids, is twenty-five and three-quarters (25.74) feet. The waters roll over a bed of limestone rocks, the ledges of which sometimes reach quite across, so as at low water to be very shallow; or, projecting and interlocking from opposite sides, afford nothing but winding, difficult, and dangerous channels.

The fall of the river is not regular, but, like that over the lower rapids, is, as might be expected, greater over the reefs and less in the channels; so that the velocity of the current, varying with the descent, and being continually checked by the rocky bed of the river, its tortuousness, occasioned by the projecting ledges above referred to, though not so great as the natural fall would predicate, is still rapid and difficult to overcome. The difficulty consists mainly, however, in the short turns and narrowness of the passes between the reefs, which oblige boats to cross the current in an oblique direction, running the risk of being dashed against the rocks. As a matter of course, the descending boats, being swept along by the current, run the greatest risk. But Captain Lee has shown that it is practicable to remove these obstacles, so as to afford a safe passage up and down both of the rapids.

The General Government is certainly interested in hastening these projected improvements; having annually considerable supplies to send to the already established military posts of Prairie du Chien, the St. Peter's, and others that will probably soon be required; as well as to facilitate future transactions with the Indians, which the onward march of events so plainly indicate must, of necessity, take place before long.

But here, again, as I have been anticipated by Dr. Owen, I must return to the Coteau des Prairies.

Southwest side of the Coteau des Prairies.

I have already stated, I think, that the lower portion of the Coteau des Prairies forms two spurs; one of which turns off the rivers that have been precedingly described into the Mississippi, the other into the Missouri. The divisional line of these two spurs is plainly indicated by the course of the Des Moines from 43° 30' of north latitude; and the one now referred to is a prominent ridge, separating the waters that empty into the Des Moines from those that flow westwardly into the Missouri. But, as it falls off in a very gradual slope when it has reached already 42° of latitude, the head-waters then take first an E. and afterwards a S. S. E. direction, and are divided from each other only by moderate swells or undulations of the country, that cause them to ramify into a rain of streams, carrying their waters, after long ramblings, easterly to the Mississippi, and southerly to the Missouri, until they finally unite.

To the north and west of *Nadoway*, or Snake river—meaning a particular species of snake—several important streams take their rise on that side of the Coteau des Prairies I am now considering, to empty themselves, of course, finally, into the Missouri. I shall now give an account of those which appear to be least generally known.

Inyan-yanke river, or Little Sioux.

The name of this river implies that there is a rock somewhere along its course.* It has been heretofore designated as the Little Sioux river, and has its origin from a group of lakes, the most important of which is called by the Sioux *Mini-wakan*, or Spirit Water, hence its name of Spirit Lake. This lake has a triangular form;

Spirit Lake.

being about seven miles wide at its largest extremity, and seven miles in length. It is not remarkably well wooded; the smaller lakes to the north of it being better supplied in this respect.

Tchan-kasn-data river, or Sioux river.

This is the Big, or simply the Sioux river, and is one of the most importance to the country through which it flows. Its Indian name means that it is continuously lined with wood. Its sources are at the head of the Coteau des Prairies, not more than a mile from those of the St. Peter's, and separated only by a low ridge, as Mr. Fremont and I had an opportunity to observe. Its length cannot be less than 350 miles; in which distance, there are two principal bends—the more southerly and smaller being terminated by a fall, said to be the only obstacle to its entire navigation. From this circumstance, the upper part of the river bears another name: the Sioux calling it *Watpa-ipak-shan*, or Crooked river, and the French *la rivière Croche*. It flows through a beautiful and fertile country; amidst which, the Ndakotahs, inhabiting the valleys of the St. Peter's and Missouri, have always kept up summer establishments on the borders of the adjoining lakes, whilst they hunted the river banks. Buffalo herds are confidently expected to be met with here at all seasons of the year.

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* *Inyan-yanke* river is said to be navigable for canoes. As I saw but the two extremities of this river, and having obtained no reliable information concerning its intermediary courses, I do not insist on its accurate representation on my map. I may most probably have placed it too high up one of its tributaries—the *Otcheyedan*—a name derived from a small hill, the literal meaning of which is "the spot where they cry," alluding to the custom of the Indians to repair to elevated situations to weep over their dead relations.

It may not be amiss to remark, in this place, that this river *Tchan-kasndata*, spoken of by the Madowessies of Captain Carver, is that which he mistook for the Missouri. Looking over the map that accompanies his book of travels, and examining the position which he lays down as occupied, on the north of the St. Peter's, by the Indians with whom he took up his winter quarters, it is surprising that he should not have mentioned the famous *Ké-ipahah*, the head of the Coteau des Prairies, so important and so conspicuous, in the eyes of those among whom he was sojourning.

Wasecha, or Vermillion river.

This river is scarcely more than sixty miles long. It issues from two lakes, which the French have named *Lacs aux Bois léger*—Light-wood lakes. Near its entrance into the Missouri, it forks; owing to a remarkable promontory that juts out of the prairie, and to which are attached many romantic traditions that I have not time to recount. The river is not well wooded; it is navigable by canoes a portion of its length; and is the last that empties into the Missouri among those flowing from the western side of the Coteau des Prairies. At its mouth is the upper end of an extensive prairie, about 50 miles long, between the *Tchan-kasndata* and the Missouri rivers;* having some analogy in its general appearance with the American bottom of the State of Illinois, opposite St. Louis. Belonging to this is a beautiful grove, on a point of land called by the French "*Pointe-au-Cerf*," (Stag Point.) The Sioux name for the prairie is *Huppan-o-kutey;* or, by contraction, *Huppan-kutey;* meaning, where they hit at the elk.

We reach now a country differing essentially from that previously described, both in respect to its climate and soil, and, consequently, in its natural productions. Whatever it may lose, however, in interest in the estimation of the agriculturist, is fully compensated to the geologist, who discovers within it the beginning of the great cretaceous formation that underlies the hydrographical basin of the Upper Missouri. But, before describing it, I must needs retrace my steps, and sketch the prominent features in the physical geography of the two valleys of the Missouri and the Mississippi. For this purpose, I assume a position on the Missouri, between Council Bluffs and the mouth of the Platte river.

By referring to the "Table of Geographical Positions," in appendix A of this report, there will be found data enough to conclude that the fall of the Mississippi from St. Peter's, and that of the Missouri from Fort

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* This is the bottom designated by Lewis and Clark as the Buffalo prairie, in consequence of the great number of these animals that they saw there. Pierre Chouteau & Co., of St. Louis, keep generally a trading-post upon it.

Pierre Chouteau, to the confluence of the two rivers, are in the ratio of 45 to 85: in other words, the average rapidity of the Missouri is nearly twice that of the Mississippi.

These rates are far from being the limits of navigation by ordinary power, which I believe to be laid down within a fall of two feet to the mile. This explains, in reference to the Mississippi, how it is that steamboats of great power are now able to ascend in five or six days the great distance of 1,286 miles between New Orleans and St. Louis, which formerly required more than two months to effect by human labor. The fatigue was then so great, that it is not wonderful that the rapidity of the current should have been greatly exaggerated, so as to have suggested the epithets of powerful and terrible Mississippi.

As to the Missouri, there are other difficulties that present themselves to its navigation, even by steamboats, besides the rapidity of the current; and, among these, the principal and most insurmountable are the constant shifting of its sand-bars. If, in this respect, the Missouri is to be deemed unimprovable, this is not the case with the Mississippi along a very extensive portion of its course. It is evident that, in alluding to the obstacles in the navigation of these rivers, I have no reference to accidental accumulations of drift-wood, or the occurrence of snags, that are entirely within the control of man, and will completely disappear with the progress of civilization. The Mississippi is one of the easiest navigable rivers in the world, as it is one of the longest; and its course only requires to be a little more studied to render us perfect masters of it.

Referring once more to the table of geographical positions, the difference of level of the valleys of the two rivers under consideration may be determined. Thus, if I take the level of the Missouri at Council Bluffs, and that of the Mississippi at Rock Islands, the localities differing but slightly in latitude, (41° 30′,) we obtain for respective elevation of each above the Gulf of Mexico, 1,028 feet for the former place, and 528 for the second. In the same way, if two other places in more elevated latitudes are compared—such as Fort Pierre Chouteau on the Missouri, and the lower end of Lake Pepin on the Mississippi, both in latitude 44° 24′—we obtain 1,456 feet for the elevation of the first, and 710 feet for that of the second. These numerical relations establish the fact, that the average level of the Missouri valley above the ocean is nearly twice more elevated than that of the Mississippi.

From these considerations alone, we would expect to find the comparative vegetation of the country between St. Louis and the abovementioned limits to exhibit a change, not only on account of a change in the latitude and in the nature of the soil, but also a variety due to a difference of elevation. Accordingly, Mr. Geyer has observed that the great luxuriance of the growth in the valleys of the Missouri and Mississippi, and even the uplands, is much diminished on reaching the mouth of the Platte river on one side, and the vicinity of Rock Island on the other. Further: that, within the limits of this zone, we find gradually disappearing the most conspicuous members of the forests, as the sycamore, the pekan tree, the shell bark, hickory, pignut hickory, white walnut, pin and overcup oaks, the honey locust, &c., together with many smaller trees and plants: as the buckeye, persimmon, sassafras, trumpet flower, ginseng, May apple, &c.

From the mouth of the Platte river the forests are narrower. The principal trees are the American and red elm, the soft maple, Canadian poplar, white and red ash; the most common undergrowth, horse-briar, fox and false grapes, red root, gray dogwood, currant, and gooseberry, with shrubs and dense rushes along the banks of the river. The same trees and shrubs grow on the numerous islands that are generally bordered with black and long-leaved willows. In the higher situations, and at the head of creeks, we meet with the black walnut and mulberry, bass-wood, nettle-wood, intermingled with the common hawthorn, prickly ash, &c. On the high grassy or rocky banks, the black and bar oaks constitute the principal growth, but occasionally intermixed with the wild cherry, red cedar, hornbeam, wild roses, and sumach. The low prairies bordering the rivers have a deep, fertile soil, and abound with sedge-grasses and leguminous plants. Finally, taking a pictorial view of the country, the verdure of its hills and prairies affords a pleasing contrast with the naked sand-bars in the rivers.

I have been thus particular in describing the vegetation of this part of the country, not only as a feature in its physical geography, but as a point of comparison with the more northerly regions which I have yet to describe. For the same reason I shall now proceed to lay down the most prominent traits of its geology.

The predominant rock in this region of country to which I am now referring—namely, from the Platte river to Council Bluffs—is the carboniferous or mountain limestone, well characterized by its fossils, consisting principally of the *producta lobata, producta punctata, orthis, delthyris, turbinolia fungites, crinoidal remains, &c.*; most of these genera affording several new species as yet undescribed.

This formation is a continuation of that which underlies so vast an extent of the Mississippi valley; but having a much larger development over the States that are to the east of this river, and extending even to the Alleghanies. It is the support of important coal-basins, and rests upon a group of silurian rocks, beginning at the Falls of St. Anthony, extending itself from north to south, constituting the mineral regions of Iowa, the Wisconsin, and the Missouri, and losing itself somewhere in the State of Arkansas. This last-mentioned group is bounded at the north by amphibolic rocks, steaschists, and clay slates, that extend to beyond 47° of N. latitude; and at the south also by steaschists and clay slates, that compose the principal rocks at Little Rock in the State of Arkansas, and also those of the Washita mountains. These rocks are referrible to certain members of the group to which Mr. D'Homaluis d'Halloy has given the name of *terrain ardoisier*, and have their equivalent in the series of the *grauwacke* of German geologists. Thus, by this distribution of the geological formations, it would seem that, more particularly to the west of the Mississippi, the silurian group is imbedded within the "terrain ardoisier," or grauwacke, just as the carboniferous series, with [illegible] coal measures, overlies the silurian.

From what I have so far said of the geology of the West, it will be perceived that I have adopted the classification of the older fossiliferous rocks, as laid down by its illustrious author, Mr. Murchison. But I must confess that I hesitated about it a long time; notwithstanding the opinions of my friends MM. Vanuxem and Conrad, both distinguished geologists and conchologists, who had recognised among my fossils irrecusable evidences of the occurrence of a silurian group in the West. Having attached too much importance to the term "*old red sandstone;*" seeking, in vain, over the country that I was exploring, an equivalent for it, either mineralogical or palæontological, which would enable me to separate the carboniferous from the silurian system, unless I chose to find it in the sandstone on the St. Louis of Lake Superior, or that of the environs of Little Rock, in the Arkansas; and not feeling authorized to do so, from the absence of fossils—fearing, moreover, that these rocks were actually beyond the limits of the system under consideration, as I said before, I could not but hesitate. However, having recently become acquainted with the learned papers read in 1840 before the Geological Society of France, by MM. Murchison and De Verneuil—one "on the Devonian rocks of the Boulonnais;" the other "on the importance of determining the limits between the mountain limestone and the inferior formations"—a new light was afforded me; all my doubts were dissipated; and I then saw the necessity, in identifying the relative ages of rocks, and especially those separated from each other by long intervals of country, to attend exclusively to their fossil contents.

Starting, then, from this principle, I think I can confidently offer indubitable proofs of the occurrence of the Devonian rocks on the Missouri river.

In latitude 40° 50′, and longitude 95° 42′ from Greenwich, eighteen miles below Platte river, there is a locality known by the name of "Five Barrels Island." Opposite to that group, and on the right side of the river, a bluff, at the termination of a series of rocky banks, is separated by a small creek from another series called *Côtes de la Platte.* At the base of the bluff there is—

1st. A compact argillaceous limestone of a bluish color, from one to two feet thick; soft under water, but hardening when exposed to the air; it weathers into thin plates, presenting an uneven surface; on which there are impressions of *euomphali*, but too indistinct to be specified.

2d. A compact argillaceous limestone of a yellowish-gray color, from six to seven feet thick, containing an abundance of *crinoidal* remains, associated with beautiful and large specimens of the *cyathophyllum vermiculare* of Gold. This limestone also contains a *producta* and an unknown bivalve, together with crystallized bi-sulphuret of iron agglomerated into bullets.

The upmost portion of the bluffs, attaining a height of 180 feet above the river, I remarked to be shadowed by trees over a beautiful green sward; but I had no opportunity of examining it particularly.

It may be well to state here, that all such rocky banks as the one just alluded to, noticed by Lewis and Clark, and subsequently by Major Long, are constantly wearing away; so that they offer landmarks to the traveller only for a limited period of time. But we are not to judge of their oryctognostical character from the detritus found below them; because this is composed not only of the materials derived from the bluffs, but of others carried down the Missouri during its season of high waters. Among these materials is the oft-mentioned *pumice stone*, which is brought down from the upper parts of the river. I have ascertained, by a more careful examination than had probably been given to it previously, that it is not a true pumice, but a semivitreous substance, produced by pseudo-volcaness, that I shall hereafter describe, the region of which is laid down upon my map.

On the elevated prairies above the bluffs, the "erratic deposits" again appears; amongst which I found, for the first time, fragments of quartzite in every respect similar to that of the Red Pipestone Quarry. I find also noted in my diary, that, on the occasion of paying a second visit to another part of the bluff, the bed of limestone No. 1 rests upon that of No. 2. This error arises from the fact, that on the preceding day I had only the chance of examining the limestone amidst the confused heap of fragments at the foot of the bluff.

Mr. Murchison, in his lately published Memoir, refers to a paper by Mr. Lonsdale on the Devonian system, in which that celebrated palæontologist indicates the principal fossils belonging to it; referring, also, to the species found in Belgium and in France, as well as in Devonshire. In this list of six species enumerated as belonging characteristically to the Devonian system, I find *strombodes vermicularis*, or *cyathophyllum vermiculare;* and *euomphalus radiatus*, (Gold.) The cyathophyllum vermiculare, it appears, is the only species that is found both in the Devonshire rocks and those of the Boulonnais. Well, now, if we take into account the enormous distance that separates the small group that I have just described, with its equivalent in France and in England, will it be thought hazarding too much to detach it from the place I had first assigned to it in the lower mountain limestone, and bring it down to the Devonian system?

The group to which I am now referring, and which is at the base of the rocky banks previously described, is very fossiliferous, and has a great extent; though I had no occasion to give it but a rapid examination. I may be permitted to hope that naturalists more fortunately circumstanced will discover among it other characteristics by which to complete an identification with its European equivalents; thereby stamping upon the new classification of the older fossiliferous rocks an additional proof of contemporaneity as regards the "Far West" of America, which will most probably be verified in time over our whole globe.

This series of rocks, then, (which I feel necessitated to refer to the Devonian system, for reasons stated above,) underlying those of the carboniferous system, have, consequently, their appropriate place above the silurian rocks, members of which are found beyond Wolf river, and again, now and then, in proceeding from bluff to bluff along the Missouri.

The carboniferous rocks, which form a large and important feature in the geology of this region, are full of fossils, and may be said to offer a new field of exploration to the fossil conchologist in the great number of new species belonging to the genera *productus—delthyris, orthis, strophomena, atrypa, favosites, &c.* To indicate the numerous localities where these fossils are variously associated with each other, would only be multiplying a list of them—which I cannot afford to do in a report, the scale of which hardly leaves room to lay down the great geological divisions of the country. I would only add, that the *productus lobata*, and *productus punctata*, and the *terebratula fungites* of Phillips, appear to me to be the characteristic fossils of the carboniferous rocks in this region. They occur at localities very distant from each other—between Five Barrels Island and Council Bluffs, on the Des Moines; from Racoon Fork to the lower rapids of the Mississippi; in the vicinity of St. Louis, St. Genevieve, &c.

&c. At the last-mentioned locality, on the limestone over which the creek called Gabouri flows, the turbinolia fungites and a new species of productus are found associated with the *bellerophon hiulcus*, as well as other species; and they are all mineralized into red calcedony.

The upper strata of this Gabouri limestone present a beautiful rock with an oolitic structure, which is now quarried for architectural purposes. It is, doubtless, an equivalent of that which occurs in the Burlington group, Iowa. It extends itself to the right and to the left of the Mississippi, as as far the Ohio river, and even through Kentucky and Tennessee. My venerable friend, Dr. G. Troost, the geologist of the State of Tennessee, was the first who discovered this rock, and very sagaciously pointed out that it had no geological relation with the great oolitic *formation* of Europe. The fossils contained in the oolitic limestone of the Gabouri are obscure and undeterminable; but, in other localities, this rock has yielded *pentremites pyriformis, pentremites globosus, pentremites florealis*, that have been described by Say, and a fourth species, which is new.

I have deemed the foregoing digression necessary in order to connect the geology of the country just described, with a more recent formation previously alluded to, with which I am to meet in ascending the Missouri.

Leaving Council Bluffs, the hills on either side are observed to be at a greater distance from the river, which is itself twice its preceding width. The valley is fully fifteen miles wide; and the broad prairies that carpet it exhibit the same richness of soil and luxuriance of vegetation as those I have already had occasion to describe. The bends on the river have courses of longer radii, and are more multiplied, so as greatly to increase the travelling distance between two spots. The width of the river varies from one-fifth of a mile to two miles. In its widest parts, the navigation is frequently impeded by sand-bars and drift-wood; but, where it narrows, the current flows in a straight, onward direction, between picturesque banks or passages, such as may be seen at the mouth of Little Sioux river. But in these instances, it is easy to discover that these passes are cut off through some of the bends. Then we could not recognise many of the bends described by Lewis and Clark; and, most probably, those determined by us in 1839, and laid down upon my map, will ere long have disappeared; such is the unsettled course of the river. Already have I been informed, in fact, that the great bend opposite Council Bluffs has disappeared since our visit; and that the Missouri, which then flowed at the foot of the bluff, is now further removed, by several miles, to the east of it. It is, in this respect, curious to compare our journal of travelling distances with that of Lewis and Clark. They are found always to differ, and sometimes considerably. Yet, on arriving at any prominent station, as the confluence of a large river, the amount of the partial distances computed agree as nearly as could be expected from the methods employed to estimate them.

After a navigation of two days, the hilly country, which had receded from us since our departure from Council Bluffs, came again into sight, and we stopped at the foot of the bluff on the right side of the river. This place affords a beautiful site, formerly occupied by a Mr. Wood, an Indian trader; and it still bears his name. Having reached this place by night, and as it was fixed that the steamboat was to leave [illegible] morning before day, being very anxious to know whether [illegible] ance of the country had changed or remained the same, so soon as we had completed our astronomical observations, Mr. Fremont and I ascended the bluff, to obtain specimens of the rock in place. On examining them, I discovered that we were still in the carboniferous formation.

The next day we passed before the magnificent amphitheatre of hills, the summit of that nearest the river being surmounted by the tomb o Blackbird, a celebrated Maha chief, and murderer by poison, whose history was told in Major Long's first expedition, but has been since reproduced with various versions in many public prints. Several mile higher up, we got a glimpse of the vale watered by Maha creek, in which is the principal village of the Maha nation. The hills on the left bank of the river, of which we had lost sight, again came into view toward the close of the afternoon, covered by a soft and grateful verdure. We stopped before night at the foot of the bluff on which is Floyd's grave; my men replaced the signal, blown down by the winds, which marks the spot and hallows the memory of the brave sergeant who died here durin Lewis and Clark's expedition. Our steamboat then started under ful blast, to take shelter at the mouth of the *Tchan-kasndata*, or Sioux rive against an impending storm that soon after broke over us, and laste during the whole night.

I had previously, however, landed a mile or so before reaching the mouth of the Sioux river, on the left bank of the Missouri, to examine rocky bank, seemingly a continuation of those apparent at Wood's bil I found it to consist of—

1st. A carboniferous limestone;

2d. An argillaceous schistose limestone.

The rocks in this locality reach only to an elevation of seven or eigh feet above the level of the river; and I take notice of them here, becaus I am disposed to think that they are the last representatives of the carboniferous series in the ascent of the Missouri, and that the mouth of th Sioux river is the true limit in this direction of the old fossiliferous rock

Hyppan-kutey Prairie.

The next point of importance reached, is the great prairie known b the name of *Hyppan-kutey*, to which I have alluded befor It begins soon after leaving Sioux river. Here the Missour changing its principal direction, makes a new series of bend leaving on either side, according to circumstances, prairies of larger o smaller extent. One of these bends brought us very nearly back to th Sioux river, only a short distance from its mouth, which we had l more than half a day before. Lewis and Clark make mention of a similar bend, in the course of their journey, much higher up; but it probably has no existence at this day, as we saw nothing of the kind. I fact, after extricating ourselves from the difficulties of such a navigatio on the approach to Ayoway river, we found that we had not gone ov more than a distance of from twelve to fifteen miles in a direct line. Y within this brief space, the aspect of the country has visibly changed the nature of its vegetation.

River banks are met with thirty or forty feet high, which are mentioned by Lewis and Clark as containing alum, copperas, cobalt, &c and then seven miles higher up, there is another succession of river hi of the same character. The weather being very bad, I had no chan of visiting these two last-named localities; and, moreover, the steam next stopping place was but at the trading-post on the *Hyppan-ku* prairie, laid down upon my map. This would have been, at the time, a subject of great regret to me, had I not been informed that, in continuing to ascend the Missouri, I was to meet a series of bluffs of the same character. Accordingly, a third bluff soon presents itself on the right side of the river, and three miles south of the trading-post which was occupied by a Mr. William Dixon.

Dixon's bluff.

Before entering upon a description of this bluff, I would remark that, as the rocks of which it is composed are the same that constantly make their appearance on ascending the river, at the base of the hills that bound the valley, I shall content myself with describing them once for all. Moreover, to facilitate the reference which it may be necessary to make to the different geological divisions of a group of rocks which I propose to consider under the name of Dixon's group, or Dixon's bluff, (so called by me, after the trader that lived near the spot, and who has been one of my most devoted guides during my explorations over the great prairies situated more northerly,) I shall note the divisions of this group, in their ascending order, by the letters of the alphabet, viz:

A. Argillaceous limestone, containing *inoceramus barabini*, in great number and very much compressed, and so arranged as to give the rock a slaty structure. This stratum sinks below the bed of the river, and consequently its thickness is indeterminable; that part of it above the water on the day of my examination was three feet. Starting from this place, and ascending the river, this rock must necessarily disappear below the level of the water. It is probably more conspicuous in the two preceding cliffs I have referred to before, but which I had not an opportunity of examining. The upper portions of the rock that I did examine contain nodules of *iron pyrites*, being an assemblage of small cubic, cubo-octaedral, and octaedral crystals.

B. A calcareous marl, generally from 30 to 40 feet thick, but at this spot reduced, by a slide, to 15 or 20 feet. Its colors are gray, grayish blue, and sometimes yellow. It contains but very few fossils. I found, myself, but one *orbicula*, and what appears to be a fish scale.

C. This is a slightly ferruginous clay bank of a yellowish color, with seams of selenite, and affording occasionally rounded masses somewhat resembling *septariæ*. The selenite is in acicular crystals, or in its more usual form of rhombic prisms variously truncated.

Such are the three divisions that I have thought necessary to make in this group of rocks, and which are always thus associated as the river is ascended. This group is the basis of the cretaceous formation of the Missouri. The upper subdivisions, which I shall have occasion to establish further up, and that are not sufficiently distinct here, will complete an account of this interesting formation. It may not be impertinent to remark in this place, that it is most likely the bluffs between the Sioux and Ayoway rivers, a distance of only twelve miles, are, geologically, similarly constituted as Dixon's bluff; the cretaceous formation rests here on the carboniferous or mountain limestone.

Rivière Jaques.

On quitting *Eyapaw-hutey* prairie, the entrance to the *Wassisha*, or Vermillion river, and that of the Rivière Jacques of the French, the *Tchan-sansan* of the Sioux, are passed by in succession. In this interval, the valley hills are at a distance, and the cretaceous formation is not easily followed up; but, a little further on, it reappears on the left side, with the plateau dividing the waters that empty into the Tchan-sansan from those that flow into the Missouri. This upland is known as the "Coteau des Prairies du Missouri," or, more shortly, "Coteau du Missouri."

The elevated prairies that crown the right bank of the Missouri river, rise gradually in the direction of the Rocky Mountains, forming the northern extremity of those steppes, more appropriately designated the *American Desert.* Hence, it will be perceived that the river has its bed deeply encased in a valley flanked on the left side by the Coteau du Missouri, and on the right by the American Desert. Over a length of 236 miles, comprised within this valley between the *Niobrarah,* or "Eau-qui-court" river, and Fort Pierre Chouteau, the cretaceous formation exhibits its fullest development. It may be satisfactorily examined at many places within this range; but a perfect representation of the whole of them may be obtained, if, taking as a basis the description previously given of Dixon's bluff, there be added to it the modification presented by some of its new members.

Cretaceous formation.

I may be permitted to think that this cretaceous formation is destined to occupy a conspicuous place in the history of American geology; and, as I am not aware that any details concerning it are recorded, I shall now, to the exclusion of other matters, possibly of equal interest, say all that I know about it.

It is necessary, then, in the first place, to take both a geographical and a geological horizon. Thus, referring to the map: starting, for instance, from the *Wichapaha,* or Scalp Mountain creek, in lat. 43° 8', and visiting, successively, as follows: the hills at the mouth of Whetstone creek; those in the vicinity of Red Cedar, Snags, and Sailor's Islands, the *Mankizita,* or White-earth river, the American river, the Great Bend, (which is the *Karwichigut* of the Sioux,) it will be easy to understand all the circumstances about which I shall now give an account.

1st. The stratum A, of argillaceous limestone, observed at Dixon's bluff, has disappeared in consequence of the elevation of the level of the valley.

2d. The calcareous marl B, in horizontal stratification, continues to make its appearance in escarpments of from 30 to 40 feet, containing the same fossils—namely, ostrea and fish scales.

Over this bed, or rather between it and the preceding one, there seems to be occasionally found a thin layer of fibrous carbonate of lime; the true position of which I was a long time in determining, as I had discovered fragments of it only among the rubbish at the foot of the bluff. I have since observed it in place above the calcareous marl; and it is interesting that it is covered with casts of a fossil very much resembling the gryphea Vomer, but which Mr. Conrad has described under the name of *Ostrea congesta,* as will be seen in the catalogue of the fossils belonging to the cretaceous formation in appendix C.

It gives me particular pleasure to state, in this place, that, having furnished Professor J. W. Bailey of West Point with specimens, from several localities, of this marl, the microscope, under his experienced direction, has led to the discovery of most interesting results. I think I cannot do better than give, at least, some extracts from Professor Bailey's communication.

He says: "I received, with much pleasure, the specimens you kindly sent me by Lieut. Berry; and I would sooner have acknowledged their reception, had I not hoped for the pleasure of an interview with you at Washington. * * * * The specimens are exceedingly interesting. I found, in two of the specimens of calcareous marl, precisely the same microscopic multilocular shells I had previously detected in limestones from the cretaceous group of New Jersey. These shells resemble small nautili, and belong to the *foraminifera* of D'Orbigny. Great interest will be felt to belong to these American localities, from their connexion with the wonderful discoveries of Ehrenberg, who has shown that these minute shells (called by him *polythalamia*) constitute a large portion of chalk, marl, &c.; and the sandy deserts of Africa are often only a moving mass of these beautiful little organisms. (See the Lond. and Ed. Phil. Journal, May and June, 1841.)"

3d. The bed C, composed of a foliated and selenitous clay, acquires interest, as it develops itself in other localities. Its thickness is variable. I have found it 80 feet thick; and its strata are divided by thin layers of a more indurated white clay. In these several stages, the seleniferous clay, of a yellowish color at the bottom, becomes black and more foliated in its superior beds. The selenite is more abundant; replacing, as it were, the white indurated clay.

The specimens of selenite obtained from this division of the Dixon group are worthy of notice, in consequence of the peculiar forms that they assume—some of them presenting the appearance of leaves of trees, beautifully and gracefully scolloped; which has encouraged me to venture upon a descriptive name as a mineralogical variety by which to designate them. I call them *phylloidal selenite.* Others are in the usual shape of six-sided regular prisms, "*en fer de lance,*" lanciform, radiating, &c. I have had designs executed of those among the newest of these forms, that might interest the mineralogist. But these, as well as other drawings of fossils, cannot, in the nature of circumstances, find a representation in the present report.

4th. The rock designated as D is the last member of the trans-Mississippian cretaceous formation, as it presents itself on the Missouri river: it is a vast deposite of plastic clay, about 200 feet thick, which may be considered, however, divided into two equal parts by a stratum of argillaceous carbonate of lime in nodules, of which I had no occasion to ascertain the thickness. Many of these nodules, having fallen from their original position, are met with in considerable quantities in the beds of the ravines, and in other places. It is known that this variety of iron ore is among the best. Associated with it is a ferruginous sandstone, which presents itself in flat polygons, on the surface of which there are seen numerous concentric lines of great regularity, so as to imitate the transverse sections of a tree. The same deposite contains, disseminated through it, lumps of the yellowish clay of the inferior stratum C, and enclosing leaves of selenite, and cavities lined with concretionary gypsum. But these lumps are more frequent in the lower half of the deposite than in the upper, and finally cease altogether to appear.

There are also found, throughout the clay deposite, loose pieces of limestone, the origin of which I will not attempt to assign precisely; though they may have belonged to subordinate beds of this rock, that exist somewhere in this formation. I have collected some myself; others were brought to me by my men; and, as a notification to future geologists who may travel over this region, I signalize them by their mineralogical characters.

1. A cylindrical limestone, resembling arragonite.

2. Limestone of loose texture, yellow, crossed by small and numerous veins of calcareous spar.

3. Limestone of a grayish color, with veins of calcareous spar, and invested occasionally by dog-tooth spar. [C. carb. métastatique of Haüy.]

4. Grayish limestone, with veins of calcareous spar.

The inferior members of the group that I have just described contain, it is true, but rare and indistinct organic remains. But no richer field could be offered to the fossil conchologist than that presented by the upper portions of the plastic clay—by the variety, the abundance, and the beauty of the specimens; being nearly all new species of *ammonites, baculites, belemnites, hippurites, cytherea, tellina, inoceramus, &c.* The species, however, which, from its abundance, and the different signs under which it is found, would seem to me to characterize the whole formation, is the *inoceramus barabini* of Morton.

In appendix C of this report, will be found a list of the fossils in my collection, belonging to the cretaceous formation in the Missouri, the description and figures of which are given in the 8th volume (1842) of the Journal of the Academy of Natural Sciences, Philadelphia; to which I beg leave to refer, with my warmest acknowledgments, at the same time, to my learned and modest friend, Dr. S. G. Morton, who has furnished and added to it a tabular view of the organic remains hitherto discovered in the cretaceous strata of the United States.

The cretaceous formation now under examination also contains fossil remains of vertebrated animals. I must regret that opportunities failed me to explore it more thoroughly in this respect. I succeeded in obtaining but a few specimens; but such as my collection afforded were submitted to the distinguished palæontologist (whom I am likewise proud to name as a friend) Dr. Harlan, who, with his characteristic promptness, furnished me with a description of them, that I have appended to the catalogue above cited. I have only to add, here, that the four specimens there described are also found in the Atlantic cretaceous beds of the United States; thereby confirming the contemporaneity of the chalk formation of the West with that of the East on the continent of North America.

This cretaceous formation may be considered, I believe, as fairly exhibiting the characteristic features in the geology of the Missouri, over an extent of country more than 400 miles in length by water, starting from the mouth of Sioux river; which latter river is 795 miles from the confluence of the former with the Mississippi to the approach of the Shayen; which I have laid down on my map as the *Washtay*, or Good river of the Sioux. It will be readily conceived that, as the level of the valley of the Missouri gradually rises, there is a corresponding depression in that of the formation. But what remains of it at the spot where I left it, conjoined to information gathered, leads me to suppose that other traces of it will be found, perhaps, not far from the Yellow Stone river; so that its whole extent along the Missouri, in a generally N. W. course, would be no less than 1,000 miles. As to its western limits, without pretending to define these positively, I may state that I have in my possession interesting fragments of *ammonite placenta* and *baculite ovatus*, brought to me from the clay banks of the upper part of Shayen and White rivers. It is, therefore, probable that the extent of the formation due W. is not less than 250 miles by water, along which it is probably open to examination.

A few remarks on the physical geography of the region, which remain to be made, may help to confirm this supposition.

I shall first describe the general aspect of the country. It will be recollected that I have represented the whole bed of clay, divided into two portions by a band of iron-stone, as having a nearly uniform thickness of 200 feet, and that it is intermixed with lumps of gypsum and limestone, together with nodules of pyrites; so that a soil, produced from such materials, could hardly be expected to throw up anything but a meagre vegetation. It is of a character, too, to be so acted upon by atmospheric agents, as to exhibit, by the wear and tear of its superficial portions, every variety of fanciful summits—domes, cupolas, towers, colonnades, &c.; imparting to it a remarkably picturesque appearance, especially when contrasted with the dense vegetation that borders the river, and a narrow slip of prairies crowning the summits of the hills that are seen to extend themselves on either side.

The spirited pencil of Mr. Catlin has faithfully represented the pictorial features of this country in some of the sketches contained in the first volume of his travels.

The same physical causes, under other circumstances, produce new effects, that add to the beauty and grandeur of the scenery. Thus, the rains furrow and cut through the plastic and seleniferous clay, down to the more resisting limestone, giving rise to a sort of advancing platform, with a perpendicular elevation of from 30 to 40 feet, resembling a succession of long lines of parapets.

Pseudo-volcanoes, or smoking hills.

But I have now reached the proper place to treat of a very interesting phenomenon observed in the midst of this cretaceous group. It manifests itself by the occasional appearance of a dense smoke at the top of some conical hill, or along a line of country bounded by the horizon, so as to awaken the idea of distant volcanoes; hence I have chosen to call them *pseudo-volcanoes.*

The smoke from these hills and the crevices in the plastic clay is said to last at the same spot for a long time—say two or three years; indicating at them a large accumulation of combustible materials. It is not, to my knowledge, accompanied by luminous vapors, and is silently wafted along the valley which it mournfully shrouds. The observance of this phenomenon, associated with the frequent recurrence of a peculiar light and spongy stone that the Missouri carries down and strews along its shores, and which has been mistaken for pumice-stone, has led to the often-controverted opinion that there was a volcanic region on the Upper Missouri. There are, however, no *true* volcanoes over any portion of the United States east of the Rocky Mountains; and it was this belief that led me to the adoption of the word *pseudo-volcano.* Neither is the substance found in these regions, and commonly called pumice, a true pumice; and, by a similar analogy to that which has prompted the name of its probable origin, I have called it a *pumiciform* stone, *(roche pumiciforme.)*

Before proceeding to account for the appearances and circumstances attending these smoking hills, I must add a few more facts concerning their traditional and recorded history. There were none in activity when I ascended the Missouri in 1839; and so would seem to have been the case at the passage of Lewis and Clark at the beginning of this century. But, previous to my arrival, since the memorable expedition last referred to, and during a period of three years, they were seen, as my information goes, by many intelligent persons engaged in the fur-trade, all of whom are naturally observant, and most of them of unquestionable authority. I have no doubt, therefore, of the existence of these hills; and, in truth, upon a distance of 120 miles from Scalp mountain to beyond the *Karrashigrah*, or Great Bend, there is nothing to be seen but a black zone, known to the voyageurs as *"les côtes brulées"*—*"collines brulées,"* —viz: burnt bluffs, or burnt hills.

In other respects, the character of the vegetation, which is always scant upon this zone, indicates, in a measure, the epochs when it was visited by these subterranean fires; the blacker and more steril parts being the most recently burnt. They are pointed out by the voyageurs, and I have indicated several on my map. The fossil shells, that I have precedingly enumerated, lose their brilliant opalescent appearance, and are partly calcined, though still preserving their specific distinctions. Layers of the clay are also met with, so altered as almost to deserve the mineralogical name of porcellanite; in fact, all the minerals belonging to the formation exhibit the alteration which might be supposed produced by exposure to that sort of action now to be assigned.

I believe, and it is also the opinion of my friend Professor Decaisne, to whom I submitted my specimens, that these pseudo-volcanic phenomena may be compared with those described as occurring in other portions of the globe, under the name of *terrains ardens*; although they are not here accompanied by the emission of flames. They are evidently due to the decomposition, by the percolation of atmospheric waters to them, of beds of pyrites, which, reacting on the combustible materials, such as lignites and other substances of a vegetable nature in their vicinity, give rise to a spontaneous combustion; whilst further reactions (well understood by the chemist) upon the lime contained in the clay bed, produce the masses and crystals of selenite that are observed in the lower portion of this interesting deposite. This is the theory which, with some little confidence, we have formed of these pseudo-volcanoes.

It may be interesting to future travellers to learn that, in order to collect both fossils and most interesting specimens of crystallized selenite, without taking the trouble of making diggings, it is only necessary to perambulate the zone of plastic clay shortly after it has been washed by heavy rains. Under such circumstances, should they be favored moreover by the reflections of the sun, they will be struck with the appropriateness of the designation of these hills, as applied both by the voyageurs and Indians—namely, of *shining mountains*. In truth, it is not unlikely that these hills, a portion of them attaining an elevation of from 500 to 700 feet above the river, were some of those referred to by the Sioux of the Mississippi, who, conversing with the first white men who visited them, and long afterwards with Capt. Carver, spoke of the Shining Mountains of the West.

These (so named) pseudo-volcanoes are not, however, confined to the valley of the Missouri. Traces of them are not unfrequently found over the more westerly regions, as far as the upper portions of the rivers called by the Indians *Mankizitah* and *Wasiitay*. The name of *Manki-*

zitah-wakpa, usually translated by that of "White-earth river," (or simply White river,) means, more properly, Smoking Earth river; whence I have concluded that these indications of *pseudo-volcanoes* were at the same time evidences of the recurrence of the upper members of the cretaceous formation, the limit of which I have assigned as being somewhere eastward of the Black Hills. The name of "Mauvaises Terres" (bad lands) has been applied to districts cut up into deep and intricate chasms, from which the traveller could hardly hope to extricate himself without the assistance of a good guide, and that are doubtless due to the burning out of their pseudo-volcanoes.

However this may be, there can be no doubt that the region of country drained by these rivers which I have last mentioned, will present a wide and fertile field of discovery to any geologist whose good luck it may be to give it a thorough exploration. For there he will find an opportunity not only of studying the continuation of the secondary cretaceous formation previously described, but likewise of discovering the approach to a *tertiary* formation; the equivalents of which are doubtless to be found to the west of the Rocky Mountains, as they have already been to the east, on the Atlantic borders.

I have reason also to believe, from specimens exhibited to me by the Hon. L. Pratte, (who has made himself familiar with the subject during his repeated journeys to the Yellow Stone river,) that a rich harvest might be confidently expected, in this direction, of bones belonging to the larger mammiferæ, such as characterise other portions of the hydrographical basin of the Missouri. Mr. Pratte was kind enough to offer me very valuable specimens of this kind; the acceptance of which I felt compelled to decline, owing to the circumstances under which I was placed rendering it impossible for me to take charge of their transportation. These fossil-remains had been collected in the flat country bordering on the *Ni-obrarah*, or "*Eau-qui-court*" river, at a distance of from 250 to 300 miles from the entrance of this river into the Missouri.

Fort Pierre.

Fort Pierre Chouteau, or simply Fort Pierre, is the upper limit of my navigation of the Missouri, and of the examination which I made of the cretaceous formation that borders it. I had been led there by the necessity of stopping to make preparations for my overland journey, which was to take me over the great prairies to the north of the Missouri. The fort is situated on the right bank of the river, three miles above Teton river, called by the Sioux *Wakpa-schicha*, or Bad river; and frequently by the traders, Little Missouri; though there is a river of this name higher up, on the same side.

We arrived at the fort on the 12th of June, 1839, having left St. Louis on the 4th of April; so that we were sixty-nine days in ascending a distance of 1,271 miles, which, on the Mississippi, and with a steamboat of the same power, could have been accomplished in twelve days.

The Antelope steamboat belongs to the American Fur Company of St. Louis, then under the firm of Pratte, Cabanné, & Co., afterwards under that of Pratte, Chouteau, & Co., and now Pierre Chouteau & Co. This steamboat is employed exclusively in the transportation of freight for the use of the company; but, with an enlightened liberality, it never fails to allow its convenience to travellers who are endeavoring to contribute usefully either to the arts or sciences. I am therefore indebted to this spirit of accommodation on the part of the company for my passage, as well as that of the persons who accompanied me. We were, moreover, fortunate in having for fellow-travellers two very amiable and intelligent gentlemen, Mr. W. Laidlow and Mr. Kipp—the former going to the for on the Yellow Stone; the other, if I am not mistaken, to that on the Maria.

The steamboat was commanded by a young officer both active and intelligent, on his first trip to the Upper Missouri, but was aided for the firs six hundred miles by the counsel of Major John F. A. Sanford, one of the firm, whose remarkable presence of mind and ingenuity in surmounting difficulties have often excited my admiration. The other passengers were various *employés* of the company, among whom were sixty or seventy Creoles, Canadians, and half breeds, who, in the fur country, ar dubbed *pork-eaters,* (*mangeurs de lard,*) until a more hazardous and useful course of life entitles them to the high qualification of *voyageurs.*

But, notwithstanding the great skill with which the navigation of ou boat was managed, and the high power that propelled it, our voyage wa sometimes interrupted for weeks, owing to the numerous obstacles presented by the river. It would seem that a Missouri pilot ought to possess not only a quick sight, but an intuitive perception to discover through its turbid waters the channel which yesterday had no existence, presents itself to-day, and will most probably change to-morrow.

The principal agents of the factory, on my arrival at Fort Pierre, were Mr. P. D. Papin and the late Jacob Halsey, to whom I feel much indebted for the zeal manifested in aiding me with my preparations.

All the information that I had been receiving for better than a yea that I meditated my voyage of exploration over the regions comprised between the Missouri, the Coteau des Prairies, and the sources of the Mississippi, had resulted in a conviction that I should not hazard myself i this untravelled country without a force of at least fifty men; because o the risk of falling in with some hunting camps that are not unfrequently occupied by hostile nations, eager in the pursuit of the buffalo.

Having foreseen that I could not, without difficulty, muster such force upon the Missouri, I had, during my exploration of the Coteau de Prairies, and of the valley of the St. Peter's, in 1838, taken steps to secure a reinforcement, which, starting from Lac-qui-parle, would meet m at an appointed time and place on the river Jacques. But, in spite of al precautions, I was disappointed in obtaining it; though, luckily, I became sensible of the disappointment only after I had taken a resolution which rendered this assistance needless; for, until then, the convictio that I had it at my command was used to operate upon the "*morale*" o my small squad, by flattering them under trying circumstances with the hope (that was fast vanishing from before myself) that we might soon expect all the relief that we wanted. In reference to this, I may be permitted to relate some of the incidents in the outset of this campaign.

I supplied myself at Fort Pierre with all that I could desire in the way of horses, vehicles, munitions, and provisions; but in respect to men, the post was at that time itself in want, so that it could spare me only six. I had brought up with me from St. Louis only five men, who, for my purposes, were certainly worth ten. Four among them had proved themselves, by numerous journeys across the prairies, as well as voyages ov the Rocky Mountains. One of them was Etienne Provost, known a *l'homme des montagnes*—the man of the mountains. I may remark her that these Western voyageurs are distinguished from the same set of men who do service on the Northern lakes, by their never singing, and, although apparently sullen and discontented, are most faithful, cautious, and courageous in the midst of all dangers. The fifth man was Louis Zindel, who had belonged to the Prussian artillery, and, though totally inexperienced as a traveller in the Indian country, possessed otherwise many qualifications that rendered him most useful to me. He was a capital maker of rockets and fire-works, which proved very serviceable to me both for defence and for signal.

Being at Fort Pierre, I met with a Mr. May, of Kentucky, and a young man from Pembina, who expressed a desire to join my party, as they were on their way to the British colony situated on Red river of the North. The accession of their company, and the great acquaintance possessed by the former with all things relating to the West, made me rather anxious than otherwise to have them among us. I had previously engaged William Dixon as a guide and interpreter, when we stopped at the Hup-pan-kutey prairie. I now thought it advisable to engage, in the same capacity, Louison Frénière, and the son of Baptiste Dorion, the interpreter at the post. Both Dixon and Frénière had the reputation throughout the country of being the most adventurous and successful hunters, as well as the most experienced guides.

On the 1st of July, Provost, whom I had promoted to the rank of head-man, came to announce that all our equipment was in readiness; at the same time Louis Zindel reported that he had prepared his rockets and other defensive missiles; which being duly inspected, I gave orders to have the whole transported to the left bank of the Missouri. The roll being called, it was found that, including Mr. Fremont, Mr. Geyer, and myself, we mustered in all a force of nineteen strong. It was but a small one; but, relying on the pyrotechnics of Louis Zindel, the expectation of meeting with our reinforcement from Lac-qui-parle, our own good arms, and an abundance of ammunition, we shouted our huzza of departure, and got under way; not, however, without encountering some difficulties during two days, that I will now relate.

For the previous two weeks the waters of the Missouri had considerably swollen, so that the breadth of the river, at the place where we were to cross it, was a mile and a half: the current was very strong, and our passage could not be effected, notwithstanding all the activity and experience of my men, in less than a day and a half,—the afternoon of the 1st, and the whole of the 2d of July. Mr. Fremont, Mr. Geyer, and myself, took advantage of this delay to close our scientific labors on the spot, and to post up our journals and field-books.

This would be the place to introduce a few historical notices relative to the Indian trade on the Upper Missouri, the introduction of steamboat navigation in 1832, as well as its extension to the Yellow Stone river, due, altogether, to the enterprise of the American Fur Company of St. Louis. I should like to treat here of the distribution of the Indian nations in this region of country, their respective numbers, and their present relations with the Government. I could also give a painful account of the terrible effects (of which I was often myself the witness, from 1836 to 1839) of the small-pox; which scourge brought to light before me the strange ideas and superstitions that control the moral existence of these children of nature. But the mass of information that I have collected would furnish the subject of too many chapters that might be deemed irrelevant to the present report. I leave them for another occasion.

On the 2d day of July, at 4 o'clock, p. m., there remained to effect the passage of seventeen horses across the river. But the bark which had been procured was too small and too feeble to support more than the men. It became necessary to urge the horses to swim across—each man of the party taking charge of one horse. It may be well supposed that there was no lack of confusion during this truly perilous ferry; and, to this day, I thank God that men, horses, and baggage were not buried under the slime of the Missouri. The night was passed at the foot of the hills opposite Fort Pierre; and the next morning, the whole caravan (consisting of nineteen persons, ten cars, and thirty horses) were under way, ascending the hill to the Coteau du Missouri above.

The plateau that crowns the hills just referred to, has an elevation of not more than 500 feet above the waters of the Missouri; but its slope on the river side is very steep; so that, referring to the map along its whole length from the *Ni-obrarah* river, it will be seen to drain nothing but short creeks. Hence it was with great difficulty, and not until after a lapse of three hours, that we succeeded in reaching the open and unbroken country. In the meanwhile, the scouters had fallen upon a small herd of buffaloes, from which they obtained a very acceptable mess of fresh meat, of which we had been deprived for some time. This circumstance, together with the necessity of making sundry repairs to our vehicles, induced me to order a halt, after a less number of hours than is usual; for we were not more than eight miles to the N. E. of Fort Pierre. It will be seen, however, that, from this spot, our journeys assumed a regularity that will dispense with the necessity of my giving any detailed accounts of them.

On reaching the Coteau du Missouri, there are no further apparent traces of the cretaceous formation. It is a rolling prairie, the soil of which is a mixture of fine sand and gravel; but still, it is partly covered by a short, sweet-scented, and grateful verdure. An inspection of the gullies shows that the basis of this soil is the erratic deposits previously described. The siliceous particles of the soil are blackened by the smoke of the vernal and autumnal fires of the prairies; and, as the growth is too scant to prevent the dust from being raised by the almost incessant winds that blow over them, the traveller is very much inconvenienced. There are no springs to quench the thirst; and it is only at wide distances apart that small pools are met with, bordered by aquatic plants, towards which the experience of his guide is necessary to bring him to his bivouac, where he must needs have recourse to the dried dung of the buffalo for fuel. It was in the hope of extricating ourselves from difficulties of this kind, that we made an examination of the forks of the *East Medicine* river, which empties into the Missouri about fifteen miles below Fort Pierre.

Coteau du Missouri.

This last-mentioned river derives its name from a beautiful hill on its right bank, called by the Sioux *Pahah-wakan*—translated by the voyageurs, "Butte de Medicine," and, in English, Medicine hillock, or knoll. It is to be remarked, in fact, of the prairies of this region, that they present such low insulated hillocks, to which the Sioux apply the somewhat generic name of *hé* or *pahah*, according as they are more or less elevated above the surrounding plain. The affix *wakan* indicates that the locality is to them peculiarly remarkable, or even sacred, and a spot which they select in preference for some of their ceremonies.

We ascended to the top of the *Pahah-wakan* to enjoy the view over the vast prairie before us, where we could discern herds of buffalo as far as the eye could reach. This was, to say the least of it, a very consoling prospect.

Before quitting the forks of East Medicine river, we had made an ample supply of water and wood; a necessary precaution, for soon every appearance of running water disappeared. The green plains regain their uniformity, bounded only by the horizon, and presenting a smooth surface, without one sprig of grass higher than another. The deep furrows made by the buffaloes in their migrating excursions from north to south, and south to north, are the only irregularities of the surface. However, as the direction of our route is towards the eastern border of the plateau, we could not help remarking, that there the undulations of the prairie are shorter, their intervals deeper, and, finally, swell into hills of 80 to 100 feet in elevation. We had then reached the dividing ridge between the waters that empty into the Missouri, and those that flow into the river Jacques. The mean elevation of this ridge above the sea is 2,100 feet, and goes to 2,200 feet if the mean height of the hillocks formed of the erratic deposits be taken into the estimate. One of the points of this ridge is indicated upon the map as my astronomical station of the 6th of July, on the route taken by us over these regions; which route is also laid down. Five or six miles from this station we reached the extreme verge of the eastern limit of the Coteau du Missouri, whence a most magnificent spectacle presents itself, extending over the immense hydrographical basin of the *Tchan-sansan*, or river Jacques.

Dixon, in truth, had been managing a surprise for us; he had been leading me through ravines, and over hills, until we gained the spot upon which he wished to place me. Noticing my admiration, he characteristically exclaimed, "Well, come now, you want geography: look! there's geography for you."

Soon after we commenced to descend the eastern slope of the plateau, and came upon an encampment of Yanktons, whom we had previously met on the *[illegible]* prairie, and to whom we had communicated the plan of our itinerary. They were friends or connexions of Dixon and Frénière, whom we were glad to overtake. The encampment consisted of eleven lodges, containing about one hundred and ten persons; and as they were abundantly supplied with provisions, they were enjoying themselves in the fullness of their heart.

We pitched our own tents upon the same prairie, and I had an opportunity to enter into a long conversation with the chief of the party, (the Eagle,) one of the most intelligent and brave Indians with whom I ever became acquainted. He gave me some very important information in reference to the conduct of our expedition across the prairies, so as to avoid any unpleasant rencounter with the warlike parties that meet here during the hunting season. Perceiving that I had but a few men with me, he kindly offered me an additional escort of ten of his men; which offer I thought proper to decline, for two reasons: first, because I was unwilling to deprive his party of an assistance and protection that it might itself want on some emergency; and next, for the more prudential consideration of preserving an absolute neutrality. For, in case of meeting with any hostile parties, an attack might be commenced, the baggage robbed, and the horses stolen, before having time to reconcile matters by a friendly intercourse.

Otuhu-oju, or Oakwood settlement.

Early the next morning, having distributed our presents to the Yanktons, we continued our descent of the Coteau du Missouri along the *Wamdushka*, or Snake river, that takes its rise on the plateau which we had just left, to empty itself into the *Tchan-sansan.* Thence we proceeded to Lake *Tchan-ra-ra-chedan*, or lake of the "scattered small wood," the aspect of which is grateful to the traveller, but, from the impurity of its water, affords him but little relief; and then, fifteen to eighteen miles farther, we reached the river Jacques, at a very celebrated spot, called by the Sioux *Otuhu-oju*—meaning, literally, the place "where the oaks spring up," but which I have designated on my map as the "Oakwood Settlement."

Otuhu-oju (or, as the French call it, *Talle de Chênes*) was the place of rendezvous which I had assigned to the reinforcement that was to meet me from Lac-qui-parle. It had been for the 8th to the 12th of July, and we reached it on the 10th—with laudable exhilaration, it may be believed, after one year's appointment, made in defiance of all unforeseeable accidents. The estimate which I have made of the distance between this place and Fort Pierre is about 110 miles; its actual elevation above the sea is about 1,340 feet, and the descent from the Coteau du Missouri to the river Jacques not less than 750 feet. The last 50 miles, by our route, belong to the east slope of the Coteau du Missouri; but, as we were obliged to select our ground, allowing for this, the whole direct distance is probably 40 miles. In a similar way, estimating the distance to the head of the Coteau des Prairies, which is 30 miles to the east; the basin of the river Jacques between the two coteaux, and in the latitude of *Otuhu-oju*, may be laid down as having a breadth of 80 miles, sloping gradually down from an elevation of 700 to 750 feet. These dimensions, of course, vary in the different parts of the valley; but what I have said will convey some idea of the immense prairie watered by the *Tchan-sansan*, which has been deemed by all travellers to those distant regions perhaps the most beautiful within the territory of the United States.

I hazard, in conclusion of my remarks on the physical geography of the valley just described, the suggestion that it has been scooped out by some powerful denuding cause, and that its original geological character was such as is now observed in the Coteau du Missouri and the Coteau des Prairies, by which it is bounded.

It is only necessary to cast a glance over the map, to form an idea of the importance of *Tchan-sansan* river. It takes its rise on the plateau of the Missouri, beyond the parallel of 47° N., and after pursuing nearly a north-and-south course, empties into the Missouri river below 43°. It is deemed navigable with small hunting canoes for between 500 and 600 miles; but, below *Otuhu-oju*, it will float much larger boats, and there are no other obstacles in its navigation than a few rafts. When we turned away from the river in latitude 47° 27', its breadth was from 80 to 100 feet; and we could discover by the water-marks on its banks that, in the season of freshets, it widens out here to 100 yards, and south of *Otuhu-oju* to 200 yards. The shores of the river are generally tolerably well wooded, though only at intervals; the trees consisting primipally of elm, ash, bur-oak, poplar, and willows. Along those portions where it widens into lakes, very eligible situations for farms would be found; and if the Indian traders have hitherto selected positions south of the *Otuhu-oju*, it was doubtless in consequence of its more easy navigation into the Missouri.

The most important tributary to the *Tchan-sansan*, coming into it from its right shore, is the *Pay-wakpa* of the Sioux, the Rivière aux Ormes of the French—Elm river, which Mr. Featherstonhaugh, relying too implicitly on the well-meant information given to him by his good old guide, puts down on his map as emptying into the Missouri.

Rivière aux Ormes, or Elm river.

Elm river might not deserve any especial mention as a navigable stream, but is very well worthy of notice on account of the timber growing on its own banks and those of its forks. Hence it is that the Indian hunting parties, proceeding upon their winter chase across the Coteau des Prairies to the Coteau du Missouri, always take this route; not only, perhaps, for the supply of wood, but also in the expectation of meeting with game. The trading post of Fort Pierre, likewise, occasionally sends an agent to barter with these migratory Indians. It was in this capacity of agent that Louison Frénière spent among them the winter of 1836–'37, during which he encountered some trying difficulties. The buffaloes did not make their appearance that winter, and the small-pox spread itself among all the tribes that frequent this region, to their extermination. He was left without provisions, and with no other resource than that afforded by the roots of plants, which he managed to dig up from beneath the snow. The men attached to his own service died of hunger, and when the spring came, his house was surrounded by dead bodies, alone, amidst this ravage of cold, hunger, and disease.

Ascending the shores of the *Tchan-sansan*, the bordering plains are observed to rise gradually up to the level of the Plateau du Missouri on one side, and that of the *Shayen-oju* on the other; so that the bed of this long river lies more and more deep. We left it at the spot called by the voyageurs *Butte-aux-Os*, (or bone hillock, bone hill,) in consequence of a large heap of bones of animals that the Indians have gathered up and arranged in a certain order. A few miles farther we had reached the plateau of the *Shayen-oju*. This table-land may be considered as a continuation of the Coteau des Prairies, the head of which having yielded to make way for the passage of the *Shayen-oju*, rises again to form the dividing ridge between the head-waters of the *Tchan-sansan* and those of the Red river of the North. This extension of the Coteau des Prairies goes on blending itself with the ascending plains that rise towards the Rocky Mountains, and that divide the waters of the Missouri from those of the long river *Saskatchewan*, that empties into the great Winipik lake.

The *Shayen-oju* derives its name from having been formerly occupied by a nation called the Shayen, who were driven from it and pursued beyond the Missouri, where they are still to be found. It is a river of some importance, being navigable by canoes, and its banks well wooded. The extent of its navigation is from near the *Mini-wakan*, or Devil's lake, to its confluence with the Red river of the North. Its valley possesses a fertile soil, and offers many inducements to its settlement; being, moreover, reputed as frequented by animals yielding the finest peltry, to the extent that its exploration is really dangerous, because

Shayenne river.

of the rival and contending parties of Indians that one is exposed to meet with.

On reaching the plateau of the *Shayen-oju*, we were at once surprised and saddened at the sight of still interminable plains extending before us; for we had hoped that, after crossing the river, some variety would present itself, to relieve the monotony of the scenery, and the listlessness consequent upon it, which seemed to be gaining upon our party. The Indians and buffaloes, that give animation to the prairies, had not made their appearance for many days; the heat was excessive, the thermometer three times had reached 99°, and we were scarce of water; our horses were harassed by flies; and, worse than all, the whole party appeared to be, and were, dissatisfied. I could not but feel the responsibility of my situation, and made an effort to secure the successful result of our expedition, which for a while seemed to be endangered. A trifling incident brought about the change.

I had brought along with me in my medicine-chest some *tartaric acid* and *bi-carbonate of soda*, with which I composed an effervescent draught, that was freely distributed among the party. They thus found themselves unexpectedly relieved; and, regaining new energy, we proceeded on our journey. The spirits of the party were further enlivened by falling in with a herd of buffaloes a few hours after. It was an immense herd, whose migration to the southwest obstructed our onward progress for three days and nights. But it was necessary, for safety's sake, to get out of their path; and, besides, they might be fleeing before some hostile party of Indians; so that we preferred to take a safe position on a branch of the *Shayen-oju*, laid down on my map as the *Tampah*, or Birch creek.

On the second day after reaching the latter position, Dixon and Fréniere announced some Indians, of whom three were brought into our camp, who gave information that, about eight miles off, there was an encampment of three hundred lodges, consisting of Yanktons, Sissitons, and Yanktonnais, preparing for a "surround," with which it would be very dangerous to interfere. It was deemed, therefore, advisable, before advancing, to have some previous conversation with the chief of the party. Accordingly, after some necessary precautions, on the afternoon of the third day, having forced our way through the buffaloes, we met two chiefs, *Wahanantan* and *Mahto-wakan*, who were advancing to meet us, and invited us into their camp, where we had a most interesting reception. I caused many presents to be distributed among them, which brought about talks, feasts, dances, songs, and the whole series of their usual ceremonies. This lasted twenty-four hours; after which we resumed our line of march, parting on terms of perfect amity from our new acquaintances.

Having explored the plains of the right side of *Shayen-oju*, we crossed the river, and directed our route towards the *Mini-wakan*, or Devil's lake. As we advance, the wooded borders of Devil's lake gradually come into view, the rounded summits of the hills looming above the horizon. There is one of these hills in particular which the Sioux call the *Mini-wakan-chante*—literally meaning "the heart of the enchanted water," and translated by the voyageurs "the heart of Devil's lake." We could see its summit at a distance of more than 30 miles, though it is not more than 300 feet above the waters of the lake. Still, I was reminded, by its appearance, of some of the dome-shaped summits of the Jura, in sien from the plains of Burgundy. Its name is derived from its shape; when seen in a certain direction, being that of a heart, expressed, in the Sioux language, by the word *chante*, and its vicinity to the lake called by them *Mini-wakan*—enchanted water.

The sultriness of the day, and a lack of water, compelled us to come to a halt sooner than we had expected, at a distance of thirteen or fourteen miles beyond the Shayen, and four or five miles from Devil's lake. This lake is supplied by three or four smaller lakes, which we were happy to fall upon, as they afforded us good water and wood. The Metis of the Red river had, we perceived, formed a camp not far from the spot selected by us, which they had vacated but a few days before, on their return home, as we judged from the deep cuts of their loaded wagons. This was rather a disappointment to me, as I particularly wished to become acquainted with this people, among whom, it is said, are to be found the best hunters, the most expert horsemen, and the bravest warriors of the prairies. The information I have of them is this: They are called Metis, or half-breeds, being descendants of Canadians, English, and Scotch, crossed with Chippeways, Kristineaux, Assiniboins, Sioux, &c., &c. They represent the remains of Lord Selkirk's colony and of the Hudson Bay Company. As for many years they were only in small numbers, their incursions within the limits of the United States were attended with danger to themselves, in consequence of outrages committed upon them by the full breeds, the Sioux, the Rikaras, the Mandans, the Minitarees, &c. But they have since greatly increased; they number from 600 to 800 people, and have become so formidable as to compel those tribes to seek an alliance with them, and thus to maintain peace. The Metis call themselves "free people," (*gens libres*;) but by their neighbors they are designated as "*Metis of the Red river*," "*the Red river People*," "*the People of the North*."

The Metis [illegible] breeds.

It is their usage to come twice a year upon the territory of the United States where the buffalo abounds: each family has its cart or wagon drawn by oxen; each hunter has his horse, which is remarkably fleet. They are accompanied by missionaries, who regulate both their temporal and spiritual concerns. Their first campaign is made at the setting in of summer, their second in the fall of the year; and they remain about two months. Sometimes they divide themselves into two bands, directing themselves in this respect according to the distribution which they have previously ascertained of the buffalo herds over these immense plains. One-half of the hunters alternately watch over the camp, and the other half are in active pursuit of the game; and the slaughter of the buffaloes is kept up according to settled usage, until each wagon is loaded with the spoils of ten of these animals.

Mini-wakan, or Devil's lake.

The next day (being the 29th of July) we took up our line of march, and by mid-day reached the borders of *Mini-wakan* lake. We selected, for the spot of our first encampment, the head of a small bay, sheltered by a copse, and we remained nine days upon the borders of the lake; during which, we occupied three distinct stations, as well under the necessity of securing ourselves against the intrusion of warlike parties, as to supply ourselves with fresh water from adjoining ponds and small lakes.

It is not easy, however, to delineate the figure of the lake. Its first appearance did not realize the anticipations we had been led to form of it.

from popular account. The lake is on the plateau of the *Shayen-oju*, and is surrounded by swells and hills, varying in height from 20 to 200 feet, that so project into it as not to permit its whole expanse to be seen but from one spot, which I shall presently describe.

The prominent hill-top, previously alluded to by the name of *Mini-wakan-chante*, is the only beacon to the traveller leading to the lake; but even from its summits no idea can be formed of this beautiful sheet of water. He must go to a smaller eminence, known as the *Butte du Milieu* by the French voyageurs, whence alone the eye can take in the principal contours of the lake.

The greatest extension of Devil's lake is at least 40 miles—but may be more, as we did not, and could not, ascertain the end of the N. W. bay, which I left undefined on the map. It is bordered by hills that are pretty well wooded on one side, but furrowed by ravines and coulées, that are taken advantage of by warlike parties, both for attack and defence, according to circumstances. The lake itself is so filled up with islands and promontories, that, in travelling along its shores, it is only occasionally that one gets a glimpse of its expanse. This description belongs only to its wooded side; for, on the opposite side, the shores, though still bounded by hills, are destitute of trees, so as to exhibit an embankment to the east from 10 to 12 miles long, upon an average breadth of three-quarters of a mile. The average breadth of the lake may be laid down at 15 miles. Its waters appear to be the drainings of the surrounding hills. We discovered no outlets in the whole extent of about three-quarters of its contour we could explore. At all events, if there be any, they do not empty into the Red river of the North, since the lake is shut up in that direction, and since we found its true geographical position to be much more to the north than it is ordinarily laid down upon maps. A single depression at its lower end would intimate that, in times of high water, some discharge might possibly take place; but then it would be into the *Shayen-oju*.

As to the natural history of the waters of the *Mini-wakan*, it is shortly told. They are too brackish to be drunk, excepting by horses, who swallow them with avidity; they have a deeper green color than those of the neighboring lakes that are not salt. I had no means of ascertaining the density of the water of this lake; but having caused several gallons of it to be evaporated by distillation, I subsequently made an analysis of the residue, which proved to be a mixture of sulphates and hydrochlorates of soda and magnesia.

As we were not provided with nets, we could not ascertain what species of fish inhabit it. My guides assured me that there were several, and some of a large size; and this was afterwards confirmed to me by some Indians with whom I conversed on the subject. It is a fact, that my men, after a thunder-gust, found on the beach a number of red fish, and a pike which we judged would weigh several pounds. Strawberry plants were found in abundance on the sunny side of the lake.

Finally, and in conclusion of my description of the region about this lake, I may add that the soil is found, in dry weather, to be covered with a saline efflorescence, which sufficiently accounts for its being a great resort of the buffaloes. It also produces a variety of new and interesting plants, some of which will be found in the catalogue of plants under appendix B. This region, by its natural resources, would admit of numerous settlements. Accordingly, some have been attempted by the traders, but were abandoned in consequence of the hostile spirit of the Indians, who know, by experience, that the buffaloes abandon their usual licks so soon as settlements are made upon them.

Red river of the North.

Having thus accomplished the main object of our expedition, we returned along the plateaux on the left side of the *Shayen-oju*, making a reconnoissance of the ridge on which the streams that empty into the Red river of the North take their origin. Thus we were brought to cross the *Shayen-oju* a second time, and again to ascend the Coteau des Prairies; but as our returning route is traced upon the map, and a sufficiently detailed account of the Coteau has been given elsewhere, I will close this portion of my narrative with an account of what appeared to me at the time the most interesting incidents in our backward journeys from Mini-wakan lake.

Quitting, then, the borders of Devil's lake, our direction was somewhat to the east of south. During the first three miles we had to cross hills separated by large and deep coulées, (more commonly called by the voyageurs "*baissières*,") at this time perfectly dry, but through which it is very probable the surplus waters of the lake, during or after a rainy season, discharge themselves into the *Shayen-oju*, as previously suggested.

At the foot of the western hills just alluded to, we reached the western border of a fine lake, called by the Sioux *Wamduska-mde*, (Lake of the Serpents;) which I suppose to be the same that the half-breeds of the Red river have named "Lac des Chicots." This lake is in the shape of a horse-shoe, the two farthest extremities of which are seven miles apart, and its circumference from fifteen to sixteen miles, with an average breadth of one mile. It is also a salt lake, discharging its surplus waters through coulées, into the *Shayen-oju*. Its borders are in some parts wooded. But in its neighborhood we found a small fresh-water lake, on the banks of which we pitched our encampment.

Having made our usual morning observations, we took up our march the next day, leaving the *Shayen-oju* to our right, at a distance varying from four to six miles, according as its bends approach or recede from us. The surrounding country is undulating, and in some places gullied, especially on the approach to some tributary. The river on that side has three tributary forks, the banks of which are destitute of trees, so that we could always guide ourselves by the course of the Shayen, rendered conspicuous by the dense green foliage of its shores.

We were aware that to the east of the route we were pursuing lay the great basin of the Red river of the North, but at an unknown distance. Its lower portion had been visited by the expedition under Major Long; its rivers described, and their confluence laid down. I had myself placed on my map of the region about the sources of the Mississippi, after my visit to this region in 1836, the sources of those streams which empty into it from the left side, as the maps extant erroneously derive them from Devil's lake. My barometrical levellings soon convinced me that we were not far from the most elevated part of the plateau, to the east, where the true dividing-ridge between the waters that empty into the *Shayen-oju* on one side, and the Red river on the other, is to be found. The sameness in the physical character of the highlands also indicated that they were only a continuation of those forming the plateau that in this latitude separates the valley of the *Tchan-sansan* from that of the *Shayen-oju*; which latter has scooped out for itself a deep bed, through which, after many and large windings from north to east, and turning to the west and south, according to the depression in the highlands, it finds its way to the Red river of the North. It became, therefore, interesting to elucidate these points in the geography of the country. For this purpose, it was necessary for us to take an eastern course; and after a short march, we reached a spot which my barometer sufficiently informed me was on the dividing-ridge, and not far from its extreme eastern verge; so that we had actually travelled over the great swell of the plateau that separates the upper Shayen from Devil's lake and the Red river; but we were not yet in sight of the great valley of the latter, though every moment expecting to come within it. Whilst proceeding onward, we saw Dixon (who always preceded us at a distance, to indicate our best route, and, with his eagle eye, to reconnoitre the country before us) suddenly come to a stop, light his pipe, and quietly sit himself down upon a small knoll, with his back turned towards us. This was contrary to his usage, for he had always before, when he suggested a halt for any purpose, been in the habit of turning round to wait our coming. On this occasion he was immovable, and I could easily guess the cause.

When we reached him, we found him in the most ecstatic contemplation before the vast and magnificent valley of the Red river, which there displayed itself before us, spreading itself in an almost insensible slope to the east, to the north, and to the south, and bounded only by the horizon. May I not be permitted, in this place, to introduce a few reflections on the magical influence of the prairies? It is difficult to express by words the varied impressions which their spectacle produces. Their sight never wearies. To look at a prairie up or down; to ascend one of its undulations; to reach a small plateau, (or, as the voyageurs call it, a *prairie planché*,) moving from wave to wave over alternate swells and depressions; and, finally, to reach the vast interminable low prairie that extends itself in front,—be it for hours, days, or weeks, one never tires; pleasurable and exhilarating sensations are all the time felt; ennui is never experienced. Doubtless there are moments when excessive heat, a want of fresh water, and other privations, remind one that life is a toil; but these drawbacks are of short duration. There is almost always a breeze over them. The security one feels in knowing that there are no concealed dangers, so vast is the extent which the eye takes in; no difficulties of road; a far spreading verdure, relieved by a profusion of variously coloured flowers; the azure of the sky above, or the tempest that can be seen from its beginning to its end; the beautiful modifications of the changing clouds; the curious looming of objects between earth and sky, taxing the ingenuity every moment to rectify; [illegible] everything, is calculated to excite the perceptions, and keep alive the imagination. In the summer season, especially, everything upon the prairies is cheerful, graceful, and animated. The Indians, with herds of deer, antelope, and buffalo, give life and motion to them. It is then they should be visited; and I pity the man whose soul could remain unmoved under such a scene of excitement. But, although I have left much unsaid, I am admonished that it is time for me to close this part of my report, to give an account of my exploration of the sources of the Mississippi.

St. Peter's.

I was at St. Peter's when I made up my mind to visit the sources of the Mississippi; and I am indebted to my friends Major Taliaferro, Mr. Henry H. Sibley, and the officers of the first regiment stationed at Fort Snelling, and under command of Colonel Davenport, for the removal of all difficulties that might naturally be expected to present themselves to a solitary traveller, accompanied only by a few Indians and half-breeds. Several of the officers expressed a desire to go with me, of whose company I would gladly have availed myself, but that, owing to the absence of some of their fellow-officers on a court-martial at Prairie du Chien, their own services were indispensably required at the fort.

When about to leave St. Peter's, a Frenchman named Frenchet, belonging to the garrison, and known to his comrades by the name of *Desiré*, presented himself to me, with an earnest request that he might be permitted to accompany me, as well with the object of waiting on me, as to gain an opportunity of trafficking with the Indians whom we might meet. Having received good testimonials of his character, I accepted his offer, and have nothing but praise to bestow on his activity, patience, and the cheerfulness which he manifested even in the midst of some trying circumstances to which we were exposed.

Falls of St. Anthony.

On the 26th of July, 1836, I left St. Peter's, to bivouac at the falls of St. Anthony, to which place I had caused to be transported my bark canoes, my baggage, and provisions. In this journey I was accompanied by Lieutenants S. N. Plummer, G. W. Shaw, and the late James McClure, who kindly were desirous of extending to me the final shake-hand before my departure.

But, once arrived at the falls, I could not help remarking a sudden distress among the Chippeways and half-breeds who were to escort me. It arose from the circumstance that the Sioux among whom we were had robbed me of my provisions and canoe. Perhaps this might have been considered as a bad omen thrown over the success of my enterprise; but the die was cast. I was determined not to return to St. Peter's; so that Major Taliaferro, to whom I wrote, was kind enough to send me another supply of articles similar to those which had been stolen from me.

On the 29th of July, my flotilla was rapidly ascending the majestic Mississippi, laden with some of the productions from the two extremes of barbarism and civilization. The bow and arrow associated with the powder flask and rifle; sticks to notch down the days, and the chronometer to measure time; the man who notices in the heavens only the clouds that occasionally overshadow its brilliancy, and he who, armed with a telescope, can contemplate their most recondite wonders; the savage, finally, who sees in them nothing but the abode of spirits that rule the hurricanes or dispense vengeance, and the Christian, who implicitly relies on an all-wise and merciful God.

The Falls of St. Anthony form the limits of steamboat navigation, as well as of the calcareous deposits that characterizes the shores of the Mississippi from the mouth of the Wisconsin. The rocky formations then assume another type, being the several varieties of green stone, and finally passing into talcose slate, which is visible at the falls of the *Wabezi*, or Swan river, and the *Omoshkos*, or Elk river, near their entrances.

Along this portion of the Mississippi that I am now describing—namely, Ascent of the a length of 139 miles, from St. Peter's to Crow-wing river— Mississippi. the valley is wide, with river banks of moderate elevation, affording beautiful sites, that contrast remarkably with the bold escarpments exhibited below the Falls of St. Anthony. In this ascent of the river, which is full of rapids, it is necessary to have recourse to the pole or the tow-line; and, generally, following the left bank, under good guidance, and with sufficient hands to stem the current, portages may be avoided. This left bank presents almost a continued level of from ten to twenty feet in elevation, forming a retreating succession of terraces that are delightful to the view. The superincumbent soil is composed mainly of sand, gravel, and clay, intermixed with erratic blocks. The sylva consists of white and black oak, white and blue ash, red elm, two or three species of maple, the lime tree, birch, a few hickories, and walnuts. The western shore is more generally interspersed with swamps and woodlands, well set with pines, birch, and sometimes with extensive camps of the sugar-maple.

The most prominent geological feature of the country, on the eastern side of the river, a little below the Pikwabik, is a large mass *in situ* of a sienitic rock, with flesh-colored felspar, extending a mile in length, with a breadth of half a mile, and an elevation of 80 feet, known as the Little Rock. Higher up, and still on the same side of the river, at the foot of the Knife rapids, there are sources that transport a very fine, brilliant, and bluish sand, accompanied by a soft and unctuous matter. This appears to be the result of a decomposition of a steaschist, probably interposed between the sienitic rocks previously mentioned. The same thing is observed at the mouths of *Wabezi* and *Omoshkos* rivers.

On my arrival at the Crow-wing river, I could not but reflect that the Mississippi before me had been thoroughly explored during the expeditions of Major Pike, General Cass, and Mr. Schoolcraft, whose accounts were very generally known to the public. I thought, therefore, that it might be advisable to attempt another route across the country; so that, leaving the Crow-wing at the distance of three miles from its mouth, I ascended the *Gayashk*, or Gull river,* and the pretty lake having the same name. Thence I proceeded as far as Pine river, taking occasion to visit *Kadikomeg*, or White-fish lake; then, again ascending the east fork of Pine river, I reached the *Kwiwisens*, or Little Boy river, which I descended, through a succession of lakes, and over small rapids, as far as Leech lake, Leech lake. I spent a week on the borders of this beautiful and Otter-tail sheet of water, my tent being most generally pitched on Ot- Point. ter-tail Point. This was the residence of my principal guide, Francis Brunet, a man six feet three inches high—a giant of great strength, but, at the same time, full of the milk of human kindness, and, withal, an excellent natural geographer. But, during the first three days of this week, the Chippeways of the lake greatly annoyed me; and, from mutual misunderstandings, even put my life in jeopardy, as my guide scarcely dared to side with me, for fear of exposing himself. The cause of all this appears to have been, that I was not sufficiently provided with articles to be disposed of as presents; which circumstance, implying poverty, seemed among Indians to entitle me but little to that hospitality which I needed. How I succeeded in pacifying them, remains to be related.

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* I have translated this name from that of the Chippeways, which is *Ke-gayashkon-si-kang*, or "the place where there are little gulls."

The Rev. Mr. Boutwell, who was endeavoring to establish a mission among the "pillagers" who inhabit the borders of Leech lake, would have willingly come to my assistance; for he had learned that a *Keyash-wemitig-oji* (which means "*a Frenchman of the olden time*") had arrived.* He could hear by day and by night the sound of the drum, with the shouts and songs of the Indians. He knew, also, that the principal chief, *Eshkibogikoj*, (commonly called Flat Mouth,) was absent, and that the young men would be very troublesome; but he was on the opposite side of the lake, and the wind had been blowing a gale for several days, so that he could not, without danger, attempt to cross it. On the fourth day, however, he arrived; and, although totally unknown to each other previously, a sympathy of feeling arose—growing out of the precarious circumstances under which we were both placed, and to which he had been much longer exposed than myself. This feeling, from the kind attentions which he paid me, soon ripened, on my part, into one of affectionate gratitude. On his arrival, things assumed a more peaceful aspect. I succeeded in establishing feelings of good will among them, which they never afterwards belied during the three subsequent years that I had occasion to meet with them in their own country or at St. Peter's.

Having lessened my equipage, and made arrangements to proceed to the sources of the Mississippi, I left Leech lake in a bark canoe of sufficient size to contain my instruments, some provisions, and three persons besides myself, who were Désiré, Francis Brunet, and a respectable Chippeway named *Kegwedzissag*, who was well acquainted with the country I wished to visit, and which he called his own, as he was in the habit of hunting over it.

Ascent to the sources of the Mississippi.

Leaving Leech lake, we crossed several small lakes, and reached the one called *Kabekonang*,† the name being derived from *kabe*, to disembark, and *mikana*, a path or trail; or, in its full meaning, "the place where one disembarks to take up the trail or route." We ascended the river which bears the same name, and, flowing in a narrow and deep valley, is said not to freeze before January; nor, when frozen, to thaw until July. I found, accordingly, in August, that its waters had a temperature of only 54°, whilst that of the lakes and rivers which I had taken the preceding days, was between 60° and 70°. But *Kabekonang* river is well enclosed within its high banks, and well protected from winds of every description, by a thick forest of spruce firs and pines behind and along its banks, and a shrubbery of alders so thickly set that we were obliged to use our hatchets to navigate it. The salient points in the meanders of the river are made up of aquatic plants, the stems of which form peaty masses solid and tough, the moisture of which seemed to have but recently thawed. Though, in this latitude of 47° 16', and with a mean annual temperature of 42°, we are much below the regions where the soil remains frozen all the year round. Moreover, the river has but one small and short creek as a tributary, which is near its source, whilst it is abundantly fed by springs that issue from the bases of the hills.

Kabekonang lake and river.

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* In the Chippeway tongue, the expression implying the same meaning is *akwa kamig wemittig-oji*, viz: a Frenchman from beyond the waters; which expression is translated by the Canadians, un *Français de France*.

† This lake is not the same mentioned by Mr. Schoolcraft, and which is on La Place river.

I regret not to have room here to narrate numerous interesting incidents that occurred in this valley, where we saw constantly recurring the footsteps and marks of bears, wolves, deer, and otters; but the length of those details would exceed their importance.

La Place river.

From the sources of the Kabekonang, (sometimes shortly called Kabekona,) we made a portage of five miles, that brought us to the river La Place, which we ascended as far as one mile south of Assawa lake, where we found a circular camp used four years previously by Mr. Schoolcraft. But here we were assailed by swarms of musquitoes, that came pouring upon us in torrents, so as, at three different times, to extinguish the lights of my lanterns, whilst I was making my astronomical observations.

Itasca lake and portage.

The next morning we were up at half-past four, preparing for a portage of about six miles, which was before us, and was to bring us to Itasca lake, the principal basin on the head-waters of the Mississippi, as well as the projected terminus of my excursion. We were not ready, however, until half-past six. Generally speaking, the idea that there is but one effort more to accomplish one's object, inspires us with courage and strength; but it seemed to be otherwise with us to-day. We lost time in idle talk; and the night having been very hot, and the musquitoes excessively troublesome, we were exceedingly overcome, and, consequently, slow in getting our respective loads ready.

The first mile of portage is over a short swamp, which is succeeded by a small elevation, covered with white cedars and the American larch; next is a hollow filled up with fallen decayed trees, the accumulation of years, and covered with a thick layer of wet moss and other parasites. It is a buried forest, over which another is growing. We left this hollow, and reached a sandy country, thinly covered by very small pines. Here we made a halt, after this first mile, which was passed over with alacrity, and at a trot; this being the usual gait in crossing portages, as experience has shown that there is thus a saving of fatigue as well as time. The velocity thus acquired gives to the carrier the power of separating or tearing off the branches of trees that impede his way, without having recourse to his hands. Brunet carried the canoe, which weighed from 110 to 115 pounds, or more; Desiré and Kegwedzissag had each a load of from 65 to 90 pounds. As to myself, I had about 35 pounds weight, unequally distributed upon my body; and, with less experience than my companions, was generally the last to reach the halt.

It was my care, of course, at the portages, to take charge of all the most valuable things—that is, my instruments, my papers, and such articles as were necessary to encamp at night, in case I should have lost my way. In other words, it was proper to show a disposition to share the burden of hardships with my fellow-travellers; and, in case of accidents to the instruments, the responsibility was my own, which prevented dissatisfaction and preserved harmony. I carried my sextant on my back, in a leather case, thrown over me as a knapsack; then my barometer slung over the left shoulder; my cloak, thrown over the same shoulder, confined the barometer closely against the sextant; a portfolio under the arm; a basket in hand, which contained my thermometer, chronometer, pocket-compass, artificial horizon, tape-line, &c., &c. On the right side, a spy-glass, powder-flask, and shot bag; and in my hand, a gun or an umbrella, according to circumstances. Such was my accoutrement.

It will be readily conceived, from this description of my equipment, that, although the one least loaded, I was the most inconvenienced. The hard-earned experience of former portages had not yet familiarized me with their fatigues and anxieties. Necessity engrossed me with the safety of my instruments. I will confess it—my mind frequently became bewildered, so that twice during this portage I lost my way; twice I got bogged in marshes, from which I extricated myself by walking over slippery and decayed trunks of trees; and twice I reproached myself with the rashness that had led me upon such a journey.

I shall not dwell further on the description of this portage, the first three miles of which, including a momentary rest afforded by the crossing of a small lake, were attended with so many difficulties that it took me five hours to achieve that which my men went over in three; the last three miles being over a succession of ascents and descents, between which were most commonly sloughs. The soil is sandy and gravelly, overspread with erratic blocks; but there is a great variety of evergreens, and they are larger than in the region previously mentioned. I measured the elevation of the most prominent ridges. The last in the series, being also the highest, is 120 feet above the waters of Lake Itasca. This ridge, with a rapid descent, led us to the borders of the lake, where I took a barometrical observation at noon.

Schoolcraft's island.

My next move was to pitch my tent on Schoolcraft's island. The staff, at the top of which that gentleman informed us he had raised the American flag, had been cut down by the Indians. I made use of what remained of it to fix upon it my artificial horizon, and immediately proceeded to make astronomical observations, and take up the exploration of the sources of the Mississippi.

Sources of the Mississippi.

The Mississippi holds its own from its very origin; for it is not necessary to suppose, as has been done, that Lake Itasca may be supplied with invisible sources, to justify the character of a remarkable stream, which it assumes at its issue from this lake. There are five creeks that fall into it, formed by innumerable streamlets oozing from the clay-beds at the bases of the hills, that consist of an accumulation of sand, gravel, and clay, intermixed with erratic fragments; being a more prominent portion of the great erratic deposits previously described, and which here is known by the name of "*Hauteurs des Terres*"—heights of land.

Hauteurs des Terres.

These elevations are commonly flat at top, varying in height from 85 to 100 feet above the level of the surrounding waters. They are covered with thick forests, in which the coniferous plants predominate. South of Itasca lake, they form a semicircular region, with a boggy bottom, extending to the southwest a distance of several miles; thence these *Hauteurs des Terres* ascend to the northwest and north; and then, stretching to the northeast and east, through the zone between 47° and 48° of latitude, make the dividing ridge between the waters that empty into Hudson bay and those which discharge themselves into the Gulf of Mexico. The principal group of these *Hauteurs des Terres* is subdivided into several ramifications, varying in extent, elevation, and course, so as to determine the hydrographical basins of all the innumerable lakes and rivers that so peculiarly characterise this region of country.

* "Allen's report," page [illegible]

One of these ramifications extends in a southerly direction, under the name of *Coteau du Grand Bois*; and it is this which separates the Mississippi streams from those of the Red river of the North.

Coteau du Grand Bois and dividing ridge.

The waters supplied by the north flank of these heights of land—still on the south side of Lake Itasca—give origin to the five creeks of which I have spoken above. These are the waters which I consider to be the utmost sources of the Mississippi. Those that flow from the southern side of the same heights, and empty themselves into Elbow lake, are the utmost sources of the Red river of the North; so that the most remote feeders of Hudson bay and the Gulf of Mexico are closely approximated to each other.

Elk lake.

Now, of the five creeks that empty into Itasca lake, (the *Omoshkos Sagaiegan* of the Chippeways, or the *Lac à la Biche* of the French, or the Elk lake of the British,) one empties into the east bay of the lake; the four others into the west bay. I visited the whole of them; and among the latter there is one remarkable above the others, inasmuch as its course is longer, and its waters more abundant; so that, in obedience to the geographical rule, "that the sources of a river are those which are most distant from its mouth," this creek is truly the infant Mississippi; all others below, its feeders and tributaries.

The day on which I explored this principal creek, (August 29, 1836,) I judged that, at its entrance into *Itasca lake*, its bed was from 15 to 20 feet wide, and the depth of water from 2 to 3 feet. We stemmed its pretty brisk current during ten or twenty minutes; but the obstructions occasioned by the fall of trees compelled us to abandon the canoe, and to seek its springs on foot, along the hills. After a walk of three miles, during which we took care not to lose sight of the Mississippi, my guides informed me that it was better to descend into the trough of the valley; when, accordingly, we found numberless streamlets oozing from the bases of the hills. The temperature obtained at a great number of places, by plunging the thermometer in the mud whence these springs arose, was always between 42° 5′ and 44° 2′ Fahrenheit; that of the air being between 68° and 70°. Having taken great pains in determining the temperature, I have a right to believe that it represents pretty accurately the mean annual temperature of the country under examination.

As a further description of these head-waters, I may add that they unite at a small distance from the hills whence they originate, and form a small lake, from which the Mississippi flows with a breadth of a foot and a half, and a depth of one foot. At no great distance, however, this rivulet, uniting itself with other streamlets coming from other directions, supplies a second minor lake, the waters of which have already acquired a temperature of 48°. From this lake issues a rivulet, necessarily of increased importance—a cradled Hercules, giving promise of the strength of his maturity; for its velocity has increased; it transports the smaller branches of trees; it begins to form sand-bars; its banks are more decided, until it subsides again into the basin of a third lake somewhat larger than the two preceding. Having here acquired renewed vigor, and tried its consequence upon an additional length of two or three miles, it finally empties into Itasca lake, which is the principal reservoir of all the sources to which it owes all its subsequent majesty.

La Place river and Bowditch lake.

The stream which Messrs. Schoolcraft and Allen have designated as the East fork of the Mississippi, and which I have named after the illustrious La Place, (on which there is a lake that I have called after the celebrated translator of the Mécanique Céleste, Mr. Bowditch,) has its source perhaps as distant as that to which I have exclusively preserved the name of Mississippi. But, as it is less important, from having less water, I have considered it only a tributary to that to which it unites itself.

The honor of having first explored the sources of the Mississippi, and introduced a knowledge of them in physical geography, belongs to Mr. Schoolcraft and Lieutenant Allen. I come only after these gentlemen; but I may be permitted to claim some merit for having completed what was wanting for a full geographical account of these sources. Moreover, I am, I believe, the first traveller who has carried with him astronomical instruments, and put them to profitable account along the whole course of the Mississippi, from its mouth to its sources.

Mr. Beltrami.

The chronicle of geographical discoveries requires that I should mention, in this place, the name of Mr. Beltrami. This traveller, (who, in 1825, volunteered to accompany the expedition of Major Long, from which he separated himself on the plains of the Red river of the North,) in the course of his adventures fell into the vicinity of Red lake. He descended Turtle river, which empties into Lake Cass;—that had been the terminus of the expedition of 1820, under the command of General Cass, and in honor of whom it is so named. Now, as the sources of Turtle river are more distant from the mouth of the Mississippi than this lake, Mr. Beltrami thought himself authorized to publish that *he* had discovered the sources of the Mississippi. Hence, perhaps, may be explained why, as late as Mr. Schoolcraft's expedition of 1832, the sources of the river were laid down as N. W. of Lake Cass. I may be mistaken, but it strikes me that American critics have been too disdainful of Mr. Beltrami's book, which found many readers on both continents, whilst it propagated some painful errors. My opinion is, that it deserved a critical review, and a severe refutation; for it is full of mistakes, both unjust and illiberal as regards the character and customs particularly of the Indians.

After having devoted three days to an exploration of the sources of the Mississippi, and spent portions of the nights in making astronomical observations, I took leave of *Itasca lake*, to the examination of which the expedition that preceded me by four years had devoted but a short time.*

The actual name of this lake, given by Mr. Schoolcraft, without defining it, is already laid down in some book as of Indian origin. The only island that adorns it is not more than 222 yards long, with a sandy-gravelly soil, but covered by a full growth of northern trees, that give it quite a picturesque appearance. The Mississippi, on issuing from the lake, is 16 feet wide; the depth of its water 14 inches, beautifully transparent, with a swift current. The temperature of the water at seven o'clock in the morning was 62°, whilst that of the air was 56°. After an hour's descent, the breadth of the stream had enlarged to 25 feet, with a depth of 3 feet.

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* "Allen's report," page 44.

For the first 25 or 30 miles, the bed of the river contracts or dilates, according to the character of the shores. Its navigation is greatly impeded by erratic rocks, trunks of fallen and decayed trees, as well as impending branches of living ones, and rapids which, in proportion to the changes of level in the bed of the river, carried along our frail canoe with the rapidity of an arrow, or left us, when wanting, in perfect repose. I may remark here, that, on this river, like all those of this region of country, where, on the narrowing of the valley, there grows nothing but willows and aquatic plants on the shores, with a fine sand at bottom, its bed is peopled with innumerable shells, especially *unio* and *anodonta*. So far, I saw not a solitary fish.

We breakfasted at the foot of the rapids, where Lieutenant Allen informs us his canoe was upset and his compass broken; and having mentioned this incident to *Kegwedzissag*, he immediately suspended his meal to go upon an offering of tobacco and maple-sugar to the spirit of the rapids, by whom we had been spared from a similar mishap.

Dividing-ridge portage.

Having by this time descended from 40 to 50 miles below Itasca lake, and within this distance observed the entrance of four rivers, *Kegwedzissag* pointed out to us a naked bluff on the left bank of the river as the commencement of an important portage, leading to a pretty large lake on the Hauteurs des Terres, situated on one of the forks of Wild Rice river, and whence there is a descent to the Red river of the North. The Indian name of this portage is *Ozawewe-onigum*, which means, according to my apprehension, "to carry baggage from one water to another," and may be significantly rendered in English by "dividing-ridge portage." Here we met with ten canoes filled with Chippeways, coming from Lake *Winibigoshish*, who were about undertaking this portage, on their way to the upland lakes to gather wild rice. I was much surprised on seeing small nets depending from the prows and sterns of these canoes; but we were told that an old man of the tribe pretended to have discovered that there was an evil spirit lurking about the lake, of such a nature as to be caught in a net like a butterfly, who, however, if not thus caught, was capable of doing a great deal of mischief. In consequence of which, all the women of the village busied themselves in making these nets, and those of the canoes were then engaged in the same occupation. Leaving these good people, we saw the valley expanding before us, showing at a distance magnificent forests of evergreens, and presenting altogether a most beautiful landscape.

At this stage of its progress the Mississippi river is wide, winding itself in large folds, as if to take masterly possession of the country; whilst its waters are enlivened by innumerable flocks of wild fowl. Then comes another contraction of the river, which soon opens again, and extends itself to *Pemidji-gomag*,* or *Pemidji lake*, sometimes called Lake Travers. So far, the Mississippi has received the contribution of ten rivers; its wide and distended bed, completely covered by water, presents a lake (or rather pool) from 40 to 50 miles square, clogged up with aquatic plants, with intermediary spaces of clear water, looking like channels, but among which it is difficult to discover the true course of the river, for, at certain seasons of the year, the whole is nothing more than a marshy prairie. Thence we proceeded to the river La Place, thence to Lake Irving, and lastly into Lake *Pemidji*, where we spent the night.

Pemidji lake.

Pemidji lake has not received from geographers the attention that it merits, so that I cannot resist the temptation of describing the impression it made upon me. It is a magnificent sheet of water, from 10 to 12 miles long, with a breadth of from 4 to 5, perfectly clear, and without islands; the eye having a free command over gently swelling hills, receding, and thickly wooded; and it is said that no other river but the Mississippi empties into it, save an obscure rivulet at its northern extremity. I must confess that, in crossing it, I felt melancholy that, even with my artificial optics, I could not descry any evidences of civilization—no cottage of the agriculturist; no meadows; no herds; nor any of those cultivated fields, whose mellow shades contrast so gracefully with the foliage of the forest. The piercing solitary cry of the Northern diver—the precursor, according to the Indian tradition, of high winds and hurricanes—was the only evidence of living nature that presented itself.

Lake Cass.

A few hours of navigation over sundry rapids brought us to Lake Cass, which is another beautiful sheet of water studded with islands, that has been well described by Mr. Schoolcraft. I tarried here not more than three hours, to make some astronomical observations; and having by this time acquired a full Indian faith in the prognostic cry of the loon, I started for Leech lake, traversing some small intermediary lakes and portages, which brought us upon the *Kapeka-sagidowag*. This is a beautiful river, 33 yards wide, and 6 feet in depth. There is a profuse growth of wild rice on its banks. From the entrance of this river into Leech lake, we had 15 miles to travel in order to reach Otter-tail Point, where we arrived at ten o'clock at night. Two hours afterwards, a violent tempest burst over the lake. I thus arrived just in time to take shelter under the hospitable roof of my respectable friend, the Rev. Mr. Boutwell, whose residence is near a bay opposite to Otter-tail Point, where I had my tents. Indeed, it was high time for me to reach some place of rest, where I could reduce my notes to order, as well as repair my shattered wardrobe. The few days that I spent here, were days of quiet and happiness, and will ever hereafter be most gratefully remembered.

In the mean time, *Eshkibogikoj*, or Flat Mouth, the head chief of the tribe inhabiting the borders of Leech lake, returned, after an absence of three months, from a visit which he had made to the British trading-posts, to obtain ammunition, to enable him to make war against the Sioux. "The stain of Chippeway blood has been long enough on my grounds," said he, "and it is time that I should wipe it out." He had come back, however, disappointed; for he obtained from them no other presents than are usually bestowed at all trading-posts on a chief of his importance. But as he had informed his people that he would come back amply supplied, and had boasted of the manner in which he was to be treated by the whites, his pride had been wounded, and he was sad. He paid me a visit at the reverend Mr. Boutwell's, to let me know that, having learned that his men had been very troublesome to me during his absence, he wished to communicate with me in council of the whole nation, so that I might form a better opinion of them than I might be disposed to do after our first interview. It became necessary, therefore, to appoint a day.

I then returned to Otter-tail Point, made several excursions around the lake, and was present at a great number of the ceremonies performed by the Chippeways, whose numbers had increased to the whole amount of those inhabiting the shores of the other great lakes of this region.

The day on which the council was to take place, Desiré came at day-break to inform me that two large flags had been planted, and were floating at the entrance of my tent. I rose immediately, and found that one was that of the United States, the other that of Great Britain. I forthwith sent my interpreter to the chief, *Eshkibogikoj*, informing him that I was sensible of the honor that he intended me, but that I was not provided with a *forked tongue*; that, if we were to meet in council, I doubtless would have to reply to him; this I could not do, but in presence of the flag under the auspices of which I was then travelling; and that both at once could not protect the same country. My interpreter soon returned, accompanied by a messenger, Oshkabewis, bearing me an apology on the part of the chief, who, he declared, had no other intention than to pay me a compliment, and demonstrate to his nation the estimation in which he held me. The British flag was accordingly removed. In fact, I had more than once suspected that Flat Mouth's intention was to *talk* in praise of the British, with disparagement to the Americans; which I could not, under circumstances, tolerate.

The *talk* took place at the appointed time, and lasted nearly four hours; but I shall not narrate the long harangue I was compelled to listen to on this occasion, any more than what I heard from the under chiefs and speakers of the tribe, previous to my departure for the sources of the Mississippi. Still, I took them down minutely as they were recited; and, on referring to them, find them both curious and interesting, although conveyed in a style of great sameness: "The heavens were obscured by clouds"—"our women and children were suffering"—"we did not know what to do"—"on thy arrival the sky has brightened up," &c. The harangue of the chief was, however, both ushered in and followed by incidents very characteristic of Indian manners, the details of which I must postpone for another occasion.

During three successive evenings I went to take tea with *Eshkibogikoj*, and drank it out of fine china-ware. I showed him a snuff-box that had been given to me by my friend Colonel Achille Murat, on my visit to the Floridas, upon the lid of which was a full-length portrait of Napoleon at St. Helena. The chief took much notice of this portrait, and questioned me largely about this great warrior, whom he named *Naponin*; the Chippeway tongue being deficient in the consonant letter *l*. He frequently asked me for the box; and, contemplating it, would say, "Well, it is strange, on whatever side I turn it, the figure looks at me, and seems to say 'thou art my brother warrior.'" I need scarcely add, that these three long evenings spent with Eshkibogikoj were full of instruction.

By the bye, the Chippeway tribe inhabiting the shores of Leech lake have received from the Indian traders the name of pillagers, (*pilleurs*,) in consequence of some suspicious transactions of which Mr. Schoolcraft has given an account in his narrative of an expedition to Itasca lake. They have adopted this cognomen as their *nom de famille*; calling themselves, in their own tongue, *Mukundwaig*, which means *pillagers*; or *Mukundwewininiwag*, a pillaging people.

The circuit of Leech lake, including its indentations, is not less than 160 miles. It is next in size to Red lake, which is said to be 200 miles in circumference. The former has twenty-seven tributaries, of various sizes. A solitary river issues from it, known by the name of Leech Lake river, forming an important outlet from 100 to 150 feet wide, with a depth of from 6 to 10 feet. It has a moderate current, without any obstruction, and flows into the Mississippi after a course of from 45 to 50 miles.

To be more particular in the description of Leech lake, I may add that it has nine large bays, and presents six prominent points, the timbered features of which are fast disappearing beneath the ravages of the Chippeways. Francis Brunet, my guide, who sounded some parts of the lake, informed me that its depth, from Otter-tail Point across to the opposite bay, varies from six to ten fathoms. The fish of the lake, the wild rice of the bays, and maple sugar, are the three great natural resources of the Chippeways. The fisheries are abundant at all seasons, but it is principally in the spring and fall that they are most so, and are carried on to much advantage. With two nets, set over night, from 400 to 500 fish may be calculated upon by next morning; which are dried for winter provisions.

The population of Leech lake was, in 1836, estimated at about 1,000 souls, furnishing about 150 warriors. If any reliance could be placed on the stability of the Indians, this result might be used as indicating an increase of population since 1832, when Mr. Schoolcraft made it 800; but these people are too nomadic for such conclusions to be relied on.

The English name of the lake (which, in the Chippeway tongue, is *Ka-sagaskwa-djimekag*) implies, in both languages, that its waters contain a remarkable number of leeches.

On leaving Leech lake, I had the rare advantage, in these parts, of sailing down a great part of Leech Lake river, as well as the great savannah, which follows, as far as Red-oak Point. This savannah, as it is called, is an extensive marshy bottom, filled with canes, reeds, and other aquatic plants; the disposition of which divides the waters of the Mississippi into a great number of channels; from which, however, (thanks to the goodness of my guide,) we succeeded in extricating ourselves. Thence we descended to the *Kakabikans*, or Little-severed rock, where there is a small fall in the river. This spot is three miles lower than *Pake-ge-mag*, a name applied by the Chippeways to all sheets of water in the vicinity of a river. *Kakabikans* (or simply *Kabikans*) rapids, as I have laid them down upon the map, have a fall of nine feet in a distance of eighty yards. The rock over which they flow is a gray quartzite, forming the banks and bed of the river; whence it probably crops out on the St. Louis river, where are found calciferous and argillaceous slate-schist, conglomerates formed of quartz pebbles, and bound together by talcschist, containing sulphuret of iron, and a sandstone which may be possibly referred to the old red sandstone. As, on the day that I passed it, the Mississippi was pretty high, the falls of the rapids did not appear to me so great as it did to other travellers at other seasons.

From Kabikans, the country which follows, as far as Sandy lake, as well as that which precedes it, having been fully described by Messrs. Schoolcraft and Allen, I have nothing to add. I must, however, in this place, express my sense of gratitude to Mr. W. Aitkins, the agent of the American Fur Company at Sandy lake, for the many kind attentions paid me during my stay in his family.

From Sandy lake to Crow-wing river and island, (misnamed by the voyageurs *rivière aux Corbeaux* and *Isle aux Corbeaux*,) the Mississippi might be navigated by small steamboats.

At certain seasons it may be ascended even as high as *Kabikons*, for the smaller rapids that occur in the intermediate distance of 246 miles would have escaped my observation, (the waters being at their mean stage of elevation,) if they had not been pointed out to me by my guides as we passed over them.

Over the whole route which I traversed after leaving Crow-wing river, the country has a different aspect from that which the banks of the Mississippi above the falls of the St. Anthony present. The forests are denser and more varied; the soil, which is alternately sandy, gravelly, clayey, and loamy, is, generally speaking, lighter, excepting on the shores of some of the larger lakes. The uplands are covered with white and yellow pines, spruce, and birch; and the wet low lands by the American larch and the willow. On the slopes of sandy hills, the American aspen, the canoe birch, with a species of birch of dwarfish growth, the alder, and wild rose, extend to the very margin of the river. On the borders of the larger lakes, where the soil is generally better, we find the sugar-maple, the black and bur oaks, (also named over-cup white oak, but differing from the white oak,) the elm, ash, lime-tree, &c. Generally speaking, however, this wood-land does not extend back farther than a mile from the lakes. The white cedar, the hemlock, spruce pine, and fir, are occasionally found; but the red cedar is scarce throughout this region, and none, perhaps, are to be seen but on islands of those lakes called by the Indians *Red Cedar lakes*. The shrubbery consists principally of the wild rose, hawthorn, and wild plum; and raspberries, blackberries, strawberries, and cranberries, are abundant.

The aspect of the country is greatly varied by hills, dales, copses, small prairies, and a great number of lakes; the whole of which I do not pretend to have laid down on my map. The natural beauties of the country are, however, impressed with a character of sternness and melancholy; the silence and solitude of which are interrupted or revived only by the flocks of water-fowl that congregate about its waters, to nestle amidst and fatten upon the wild rice. The naturalist, however, has still an endless field of observations in the insect world, for everywhere life manifests itself in some form or other. It is, indeed, remarkable, that the more we advance to the north, (to within a certain extent, nevertheless,) the more the mosquito appears to be abundant, as every voyageur knows by sad experience.

The lakes to which I have just alluded are distributed in separate groups, or are arranged in prolonged chains along the rivers, and not unfrequently attached to each other by gentle rapids. It has seemed to me that they diminish in extent on both sides of the Mississippi, as we proceed southwardly, as far as *43°* of north latitude; and this observation extends to the Arctic Region, commencing at Bear's lake, or Slave-lake, Winnipeg lake, &c. It may be further remarked, that the basins of these lakes have a sufficient depth to leave no doubt that they will remain characteristic features of the country for a long time to come. Several species of fish abound in them. The white fish (*coregonus albus*) is found in all the deep lakes west of the Mississippi, and, indeed, from Lake Erie to the Polar sea. That which is taken in Leech lake, is said by amateurs to be more highly flavored than even that of Lake Superior, and weighs from three to ten pounds. There is another species of this white fish, called by the Indians tulliby, or ottonaby, (the coregonus artedi,) which resembles it, but is much less esteemed. Both species furnish a wholesome and palatable food. Among the other species of fish that inhabit these waters, are the maskinonge, or maskilonge; the pike, or jack fish; the pickerel, or gilt carp; the sucker, or true carp; the perch; a species of trout, called by the Chippeways namegus, &c. &c. These lakes, which are somewhat deep, swarm with leeches; and, among the amphibious reptiles, there are several species of terrapin and turtle, of which Mr. Say has described three of each kind in the appendix to the Second Expedition of Major Long.

The portage between these lakes and rivers is effected by means of Indian paths; the key to which it would be well to have, as, without it, an Indian war in this quarter might present still more difficulties than those experienced in Florida. For this reason I have been particularly careful in laying these portages down on the map, which I could not have done had I adopted a smaller scale. It must be borne in mind, that in this region, during six months of the year, no use can be made of either horses or carriages; it is absolutely necessary to have recourse to bark canoes. Any one consulting the map to study the portages, will soon perceive that an enemy, after crossing one of the larger lakes, may make his escape in almost all directions. In this respect, its utility becomes, I think, obvious, not only to travellers, but to the civil and military department of the national administration.

Of all the Indian nations that I have visited, the Chippeways inhabiting the country about the sources of the Mississippi are decidedly the most favored. Besides their natural resources (to which I have already referred) of fish, wild rice, and maple-sugar, with the addition of an abundance of game, the climate is found to be well adapted to the culture of corn, wheat, barley, oats, and pulse. The potato is of superior quality to that of the Middle States of the Union. In a trading point of view, the hunt is very profitable. The bear, the deer, and elk, the wolf, the fox, the wolverine, the fisher raccoon, musk-rat, mink, otter, marten, weasel, and a few remaining beavers, are the principal articles of this traffic. The American moose (the original, or orignal, of the Canadians) still occasionally makes its appearance. Kegwedzissag killed one near the river La Place, two weeks before he ascended it with me; so that this region may be considered as the only one within the territory of the United States now capable of supplying the finer sort of peltries. Accordingly, since 1839, the American *Fur* Company, represented by Pierre Chouteau & Co., of St. Louis, has almost entirely suspended operations in the Rocky Mountains, where they formerly employed from 400 to 500 trappers and hunters, nearly 1,000 horses, from 2,000 to 3,000 traps, and bartered off annually from fifteen to twenty thousand dollars worth of merchandise. In 1840, the principal trading-posts were withdrawn, the company limiting itself to the purchase of buffalo robes, and other peltries of less value. This company could no longer compete with that of the Hudson Bay, as the American Congress had refused to grant it certain privileges. The enormous duties which it paid on merchandise imported for its own special commerce, and those which were levied by the British

Government, defeated the object of those operations, or rendered them too onerous.

It may be that, under present circumstances, this subject deserves the attention of Congress. It is painful to reflect that the British trade has entirely superseded the American on the whole of the Oregon Territory, at a time when the nation thinks of laying claims to its rights over it. A few hundred hunters, well acquainted with the climate and the character of the Indians, might one day constitute a most valuable force; and as it is the interest of a government to protect its commerce, it might rely safely, in its turn, upon this force to defend the rights and honor of the nation.

The territory of the Chippeways, the exploration of which I had just finished, as well as that of the Sioux, upon which I was entering, had been for many years tranquil. This is, beyond a doubt, to be attributed to the firmness of the Indian agents, Lieutenant Taliaferro and H. Schoolcraft, in enforcing the law of 1832, prohibiting the introduction of ardent spirits; in which efforts they were warmly supported by Colonel Davenport, the commander at Fort Snelling, and Messrs. H. Sibley and William Aitkin, agents of the American Fur Company for the regions of St. Peter's and of Sandy lake. I found the same condition of things in 1837, 1838, and 1839, when the post was under the command of Major Plympton; for, during those years, I continued to explore the vast regions occupied by these two great nations. Then it was I bade a last adieu to the unconstrained liberty of the children of the forest, who, it requires no great foresight to anticipate, will soon have to yield to the restraints of civilization. It gives me pleasure to have this opportunity of thanking the abovenamed public functionaries, in the name of morals and humanity.

The Sioux, or *[illegible]*, occupied formerly the region about the sources of the Mississippi, and a large portion of that extending to the Missouri—forming, at this time, the Iowa Territory. They had not as yet crossed the Missouri; and it is only three years since the invasion of their country by the Chippeways, when, losing ground to the north, they sought to extend themselves to the south and west, at the expense of the Iowas, the Ottoes, the Missouries, and other nations. At this day the *Titonwans*, the seventh tribe of the Sioux, pitch their tents as far as the sources of the river Platte; whilst the Yanktons and the Yanktonans, which form the fifth and sixth tribes, pitch theirs near the Mandan country.

Formerly, the Sioux bands had their hunting-camp principally on the borders of Leech lake, or of *Missi-sagaigon-ing*,* or Mille Lacs. These bands are chiefly composed of the *Mdewakantonwans*, and of Wahpetonwans, the first and second tribes; and they are designated, collectively, as the *Isan-yati*,† *Isanyati*, or *Issanti*—that is to say, those having their lodges on sharp stones, as may be inferred from the writings of Father Hennepin, who remained a prisoner for several months with one of these bands, on the St. Francis river, near the *Isantis*, named *Tinta-tonwe*, or "village of the prairies," but which must not be mistaken for the *Titonwans* cited above, the name of which means "village of the large lodges, or large habitations."

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* This name is derived from *missi*, all sorts, or everywhere, &c.; *sagaigan*, lake; and *ing*, which is a termination used to indicate a place; so the meaning of the word is "place where there are all sorts of lakes," which the French have rendered into *Mille Lacs*. It is an absolute word; it is [illegible] pronounced [illegible].

† From *isan*, a sharp stone, but now also applied to signify the "knife sold to them by the traders;" *ti*, habitation, large lodge; and *a*, location particle.

We find still some confusion on the maps as regards the name of *Missisagaigon-ing*. Some have it laid down as *Mille Lacs*; others as Spirit lake; and on others, again, it appears as two lakes, with (separately) both names. The ambiguity arises from the fact that the same lake has been named by two nations. The one which I have adopted is from the Chippeways; that by which it is known to the Sioux is *Mini-wakan*—meaning, literally, water spirit; but, in this case, intended to signify *ardent spirits*. The river that issues from this lake has been named Rum river by the traders; which appellation the Chippeways have translated into *Ishkodewabo*, or ardent spirits; and the Sioux into *Mdote-mini-wakan*, or outlet of the ardent spirits.

As coming events will most probably render it necessary for the United States to establish, on the Upper Mississippi, a military post more distant than that of the present Fort Snelling, I might, perhaps, suggest the mouth of the Watab, or Swan river, where Major Pike had his encampment, as an eligible strategic position. By placing the post on the right bank of the Mississippi, it would command this great river, and overlook the portages that are in the rear, by which marauders coming from the north might make incursions upon the St. Peter's. The mouth of *Kagiwigwon*, or Crow-wing river, might also be used; but as it is necessary to occupy the right bank of the Mississippi, (which cannot be the case if the Crow-wing be selected,) this circumstance, added to others, deprives this place of its military importance.

When I arrived at the St. Peter's, on my return from the sources of the Mississippi, there came on a spell of cold weather, which threatened to ice-bind both rivers. It seemed that the winter was about to set in, in earnest, and I had made up my mind to remain in the country. Accordingly, I gladly took advantage of Major Taliaferro's offer of a room in the small building used by him as an office, located near his dwelling, and a quarter of a mile from Fort Snelling. We were then only in the beginning of October, and the Indian summer (which is beautiful in the valley of the Mississippi) soon brought around several weeks of mild weather, that re-opened the navigation. It was not until the 10th of November that it became entirely impeded by ice. I might have escaped from this enchanted spot; but felt myself so much at home, that I occupied myself in the study of the Chippeway and Sioux languages. As these two nations were on peaceable terms, St. Peter's, the headquarters of the Sioux, became a general rendezvous for both, when I had the most favorable opportunities of continuing my observations on the customs of the Indians, assisting at all their medicine dances, and their winter and spring ceremonies. I enjoyed, besides, all the pleasures arising from the friendly intercourse with the officers of the fort, and the families in the neighborhood. And although, at one spell through the winter, the thermometer fell as low as 19° and 22° below zero, and once as low as 30°, my time was, nevertheless, thanks to my good quarters, most agreeably spent.

St. Peter's is, in my opinion, the finest site on the Mississippi river, the natural beauties of its environs adding to its importance and grandeur. Upon reaching this place, the traveller is already premonished of the magnificent scenery which he will enjoy in ascending the river through its long, narrow, and deep valley. At the confluence of the St. Peter's and the Mississippi, there is an extensive and fertile plateau reaching far to the west, and presenting to the delighted gaze a level country, interrupted by moderate undulations of the surface, and beautified by intervening prairies, tracts of wood-land, and lakes. Fort Snelling is located on the rocky point at this confluence of the two rivers, the sight of which inspires a sentiment of self-protection in the civilized man thus confronted with the wilderness. Looking to the right of the fort, we behold a continuation of the valley of the Mississippi, whilst to the left begins that of the St. Peter's. The former has a character of sternness, produced by the denuded and abrupt escarpments of its banks, the wear of which forms rude taluses at their bases. The latter is more graceful, having gently sloping borders, divided into natural terraces, covered by a luxuriant grassy sward. Three miles from Fort Snelling, and on the right bank of the Mississippi, there is a very pretty cascade. Four miles further, we reach the celebrated Falls of St. Anthony, which, examined in detail, with the noisy boiling of its waters, rebounding in jets from the accumulated debris at its foot, its ascending vapors, and the long and verdant island that separates the two portions of the falls, with the solitary rocky island that stands in front, altogether form a grand and imposing spectacle.

From St. Anthony's Falls may be visited the Lake of the Isles, Lake Calhoun, Lake Harriet, and other lakes. Then, crossing the St. Peter's near its mouth, the traveller ascends the Pilot Knob, from the summit of which he enjoys a magnificent view, embracing the whole surrounding horizon; and if he will conclude his excursion by going to two natural grottoes in the vicinity, should his journey have commenced under the auspices of a bright rising sun, he may flatter himself that it has been most actively and pleasurably performed.

The name of St. Peter's, (the St. Pierre of the French,) it appears, has been immemorially given to the spot or landing at the mouth of the river St. Peter's, but whence the name is not known. Father Hennepin, who was the first to visit the Falls of St. Anthony, in 1680, makes no mention of this river; but his book is written very confusedly, and, as he gives no details of his route, perhaps had no occasion to visit it, and was also molested by the Sioux; the omission is explicable. On the other hand, Lesueur, in the journal of his third journey, in 1700, names the St. Peter's as familiarly known and acknowledged by traders. As for my part, I have no hesitation in assigning its origin to a Canadian by the name of *De St. Pierre*, who resided for a long time thereabouts. Carver, in referring to the supposed fortifications which he visited below Lake Pepin, mentions a Mr. De St. Pierre; but this was sixty-four years after the travels of Lesueur. However, waiving any further inquiry into the origin of this name, it is desirable that it should not be changed, because it is an important link in the history of the geographical discoveries made in this region, as well as a constant point of reference by travellers over it; so that any change would throw additional obscurity upon the early history of the country.

The name which the Sioux give to the St. Peter's river is *Mini-sotah*; and to St. Peter's as a station, *Mdote-mini-sotah*. The adjective sotah is of difficult translation. The Canadians translate it by a pretty equivaless French word, *brouillé*—perhaps most properly rendered into English by *blear;* as, for instance, *mini-sotah*, blear water, or the entrance of the blear water. I have entered upon this explanation, because the word *sotah* really means neither clear nor turbid, as some authors have asserted; its true meaning being readily found in the Sioux expression *ishta-sotah*, blear-eyed. After the same manner, they call the Falls of St. Anthony *rara*—from *irara*, to laugh—descriptive of the imitative sound they are supposed to produce. The Chippeways are more accurate; by them, the falls are called *Kakabikah*, or severed rock; and the St. Peter's river, *Ashkibogi-sibi*, the Green Leaf river.

From actual measurements made by Mr. H. Sibley and myself, the width of the St. Peter's at the crossing-place, above its confluence, is 290 feet; that of the Mississippi, below Fort Snelling, and outside of the gorge whence it issues, is 575 feet. The intervening space between these two measured spots is the rocky point on which the fort stands, and a grassy bottom, the whole measuring 1,263 feet. The mean height of the plain supporting Fort Snelling and the Indian agency, is 106 feet above the common low water of the two rivers; and the height of the *Pilot Knob* above the same level, 262 feet.

Of the numerous springs that issue from the foot of the adjoining bluffs, there is one particularly deserving of notice. It is very abundant, and perfectly shaded. It goes by the name of Baker's spring. Having taken its temperature three times a day during twenty days of the month of July, 1836, and then again during the following winter months, I never found it to vary more than 46° in July, and 45° 5′ in January. Either cipher may then be taken as the mean annual temperature of the climate of St. Peter's; and this result accords with the thermometrical observations made during several years at Fort Snelling, which gives the mean at 45° 37′.*

The geological account of this district is plainly expressed: it embraces the rocks forming the upper strata of the formation which characterizes the Mississippi bluffs from the Prairie du Chien to this place; the whole series of which to the west, in the most prominent localities, has been described by Professors Troost, Hildreth, Locke, Owen, Mather, and James E. Hall, in their several reports, officially printed, or otherwise furnished to the scientific records of the day.

The geological features of the country, in the ascent of the Mississippi, from the St. Peter's to the Falls of St. Anthony, are as follows:

1. Fine grained, unstratified sandstone, constituting the base of the bluff, and ranging in thickness between 60 and 80 feet, of a very friable character; each grain being a crystalline fragment of quartz. In some parts of the mass the grains are stained with oxide of iron; while in others they are perfectly white. It is probable that the sand furnished by the latter would serve in the manufacture of glass.

2. A compact sublamellar limestone of variable colors, as fawn, yellowish-buff, or grayish. It contains many fossils, but very irregularly distributed in the mass; some being covered with brilliant crystals of carbonate of lime, and others entirely mineralized. This bed is from 8 to 12 feet thick, weathering into layers of from two inches to a foot thick. The limestone under consideration resembles much, in mineralogical

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* Army Meteorological Register, p. 95. Philadelphia, 1840.

characters, that which has been named cliff limestone by Dr. Locke in his Report on the Geology of the State of Ohio, and which has been more recently again described by Dr. Owen in his Report on the Mineral Region of Illinois and of Iowa.* Should the two rocks be identical, No. 2 of the preceding section would then be the equivalent of the Western *blue limestone* of these geologists; with the difference, that the two rocks are here less developed than in the other localities observed by them.

3. Soil, consisting of sand, gravel, and clay, mixed with the disintegration of the limestone in place, and amidst which there are erratic blocks scattered over the plains and on the slopes of the hills, and which are traced to the summits of the Pilot Knob.

I do not deem it necessary to make any further subdivision of this group of rocks, which has already been described by the late Professor W. H. Keating, in the account of Major Long's second expedition, as well as by Mr. G. W. Featherstonhaugh, in his official "Report of a Geological Reconnoissance," &c.; and by Mr. W. W. Mather, in another report, also intended to be official, but never published, and which he has been kind enough to communicate to me.

We may differ as to the exact position of this group of rocks in the geological series; but as this is a matter to be decided by reference to its fossil contents, I refer the geological reader to appendix C, in which I have given an ample catalogue of those collected by me from the St. Peter's to the Falls of St. Anthony. There are among them some new species, that should be described and figured. I have been assisted in the determination of them by my friend Mr. T. A. Conrad, whose well-known skill as a palæontologist will be a sufficient guaranty of its accuracy. I may remark here, that it will be seen that this list of fossils embraces a few species of the Trenton limestone, as described by the New York geologists; whence we might infer that the group of St. Peter's characterises a rock of the same age as that which contains the lead at Galena, and which may probably be an upper portion of the Trenton limestone, newer than any part of that formation hitherto observed in the State of New York. To complete the catalogue, I have added to it a list of the Galena fossils, of which I possess an interesting collection, embracing some valuable specimens given to me by my friend Dr. H. King. Those interested in the subject will thus be enabled to compare the formations at St. Peter's with those of Galena, and test the accuracy of the geological deduction expressed above. On the other hand, as it is always necessary to have as great a number of fossils as possible, when we wish to identify formations at a great distance from each other, these, added to those published by Dr. Owen and Dr. Locke, may, perhaps, aid in a comparison of the rocks of the West with the Silurian system described by the New York geologists, and perchance throw some light on the connexion that exists between these and the other stratified rocks of this continent, as well as those of Europe. The fossils are classified according to the division adopted by Doctors Locke and Owen, in their report of the Galena group.

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* The friends of science and the people of the West have reason to regret that this valuable report has not been published with the necessary diagrams, which the author had prepared to illustrate his text; and that Congress did not see fit to grant the appropriation asked by the Secretary of the Treasury for the republication of a second and more complete edition.

Mr. Featherstonhaugh has corrected an error into which Mr. Keating had been led, by mistaking the fallen masses of the uppermost stratum of limestone in the bed of the river at St. Peter's for underlying rocks in place. These fragmentary rocks were there, in fact, when Mr. Keating visited the spot, of which I have satisfied myself; but they have since disappeared, and, at all events, were not there in July, 1836. They were most probably removed, partly by attrition, and the dissolving properties of the waters of the river, which are highly charged with carbonic acid. A weathering of this sort is accordingly observed on both sides of the Mississippi, on a distance of eight miles, from St. Peter's to the Falls of St. Anthony; at which latter spot it takes place to a greater extent. The underlying sandstone, being very friable, is easily acted on by meteoric and atmospheric agencies. The first effect of these is to form excavations in the sandstone, which, crumbling in, carries along the superincumbent limestone thus deprived of its support.

In ascending the Mississippi in this last-mentioned distance, the traveller is astonished to find its bed so little encumbered by the debris of the limestone; and at the St. Anthony, he is still more surprised not to find a larger accumulation of detritus at the foot of its falls. This is owing to the solvent properties of the water previously alluded to; so that I have not the least doubt that the limestone at one time covered an extensive tract of country, and that the waters reaching the sandstone, the result of this species of denudation has brought about the peculiar configuration of the surface in this region of country, as seen on the left bank of the Mississippi, going from the St. Peter's to Carver's cave, and over the whole district watered by Le Hardi and Vermillion rivers, and other places. These causes of erosion are doubtless still in full activity, and hence I am inclined to think that the recession of the Falls of St. Anthony is much more rapid than is generally supposed. As it is possible to find elements for the measurement of this result, I made surveys of the locality in the month of March, 1839. I have appended to this report a chart of the falls, exhibiting diagrams of their dimensions at that time, which will enable future generations to calculate the progress of their annual recession. The limit of the geological formation of St. Peter's is a mile above the falls, at the creek to which I have assigned the name of Fall's creek on my map. When the falls shall have reached this spot, it is probable they will come in contact with crystalline rocks forming the bed of the Mississippi, and consequently the recession will be infinitely slower.

As it is important, in geology, to determine the precise limits of formations, I shall add a few words on this subject. The geological formation of St. Peter's continues to show itself in the river of the same name, and goes on thinning out as far as *Waraju* river, (the *rivière aux Liards* of the French,) and there it disappears. Hence it passes to the head-waters of *Mankato* river, crosses the southern part of the *Coteau des Prairies*, and finally loses itself in the Missouri, Sioux, and Iowa rivers, as previously explained when describing the extent of the cretaceous formation. To the east, starting from St. Anthony's Falls, it may conjecturally be stated to cross the St. Croix, make its appearance on *Menomonie*, *Chippeway*, and *Black* rivers, not far from the rapids and falls of those rivers, and then, passing through the upper portion of Wisconsin, reaches the State of Michigan.

The two natural caves which I have mentioned above are on the left bank of the Mississippi—one four miles below St. Peter's, and the other eight miles. Both are in the sandstone, but at different elevations. The former is on a level with the river, and is reached through a short ravine, along the limpid streamlet that issues from it. Many authors have thought this to be the cave described by Carver, but erroneously. It would, in fact, be only necessary to compare the locality with Carver's description, to be at once convinced. The cave now referred to is of recent formation. The aged Sioux say that it did not exist formerly. They attach no consequence to it. It has to them no ceremonial associations. They scarcely ever visit it, and there are none of their hieroglyphics upon its sides or floor. It owes its formation to the dislocation and decomposition of the upland limestone, which have left sloughy places, the waters of which have penetrated into the sandstone, wearing it away, and giving origin to the streamlet that issues from it. The location of this cave is on my map designated as the *new cave.*

The second, four miles below the former, is that described by Carver. Its entrance has been, for more than thirty years, closed by the disintegrated debris of the limestone capping the sandstone in which it is located. On the 2d day of July, 1837, with the assistance of Messrs. Campbell and Quinn—the former an interpreter for the Sioux, the latter for the Chippeways—I set about clearing this entrance; which, by-the-bye, was no easy work; for, on the 5th we were about abandoning the job, when, unexpectedly, we found that we had made an opening into it; and although we had not entirely disencumbered it of its rubbish, I saw enough to satisfy me of the accuracy of Carver's description. The lake mentioned by him is there; but I could only see a segment of the cave, a portion of its roof being too near the surface of the water to enable me to proceed any farther. A Chippeway warrior made a long harangue on the occasion; throwing his knife into the lake, as an offering to *Wa-kan-tibi*, the spirit of the grottoes.

The ascent to the cave is by a rapid slope; and on the rocks that form a wall to the left, there are a number of ancient Sioux hieroglyphics, that mean nothing more than to indicate the names of Indians that have at various times visited this natural curiosity.

On leaving the cave and reaching the river, a stroll of a few yards to the left, by keeping close to the rocks, brought us upon a sweet, limpid, and copious spring, which had remained for a long time unknown, in consequence of the shingle and brush that conceal its outlet. This is evidently the issue of the waters of the Grotto lake; and their abundance indicates that the lake is well fed, and doubtless occupies a considerable space within the mountain. On the high grounds above the cave there are some Indian mounds, to which the Indians belonging to the tribe of *Mdewakantonwans* formerly transported the bones of the deceased members of their families.

I regret that I cannot, in this place, and at this time, introduce some novel and interesting details concerning the seven tribes that compose this great nation of the Sioux. But want of health principally, together with want of time on this particular occasion, prevent me. I have, then, no more to do to close this report, than to submit some special consideraions on the Territory of Iowa, which its present political condition may, t is believed, justify.

At the conclusion of the hostilities between the United States and the Sac and Fox Indians, in 1832, they were required to surrender a strip of country along the right or western bank of the Mississippi, extending from the northern boundary of Missouri on the south, to what are called the neutral grounds to the north; averaging about 180 miles in length by 50 in breadth, and containing about 9,000 square miles. Major General Winfield Scott was the principal agent of the United States in acquiring this portion of the Indian lands, and hence it was often called "Scott's purchase;" as also the "Black Hawk purchase," after the name of the Indian leader during the outbreak alluded to. But, in 1836, my friend Albert M. Lea, esq., then a lieutenant of dragoons, published a map and description of the country, which he called the "Iowa district"—a name both euphonious and appropriate, being derived from the Iowa river, the extent, beauty, and importance of which were then first made known to the public.

A few families settled upon spots within this district immediately after the purchase; but they were ordered off by the United States troops, as the time that the Indians were allowed to remain did not expire until the 1st of June, 1833. After this, the population went on steadily and apidly increasing. In 1834, Congress passed an act attaching this district to the then Territory of Michigan, for judicial purposes; but other elations being established between this last mentioned Territory and the General Government, it was not until the 4th of July, 1838, that the Territory of Iowa was organized, with a population of 30,000 souls. It may be well to remark, that additional tracts of land having been subsequently purchased from the Indians in 1836 and 1837, the district was increased, so as to cover an area of 11,000 square miles.

The whole amount of the Territory then, including what was separated from it on July 4th, 1836, for political purposes, to organize the Territory of Wisconsin, had its limits from the Mississippi on the east, to the Missouri on the south and west, extending to the British possessions in latitude 49° north.

These limits are surely very extensive; but, as the question of the proper limits of this prospective State, destined soon to take its place in the Union, is important in its relations to other States yet to arise, and there being but few persons acquainted with the interior of the broad region embraced by the map, it may not be inappropriate to suggest, in conclusion of a short account of this region, some views as to the most eligible limits to be given to these several States.

In a few years more, the fertile country along the borders of the present settlements will have been occupied by civilized men, cultivators of the soil. It will then be divided into new States; but, as it is known that a broad belt of uninhabitable flat country lies between the borders just mentioned and the Rocky Mountains, it becomes a difficult and yet necessary problem to divide this portion into the most convenient forms, variously to accommodate the States that will gradually arise.

But I may remark, in the first place, that two States may be formed west of the trans-Mississippian States of Arkansas and Missouri; and then, by taking about equal portions of each side of the Missouri river, embracing the mouth of Platte river, we have a third State, with a good and well watered soil. This latter division would still leave sufficien space for the State of Iowa, by extending it as far north as the St. Peter's. Now, north of the two last-mentioned States might be formed another, embracing all the remaining tributaries of the Mississippi on its wes side, as well as those of the Red river of the North, and as far north a to the British possessions.

Thus it appears, that, by a judicious division of the remaining country along the borders, taking in a small portion of the more barren regio beyond it, there is sufficient space for five new States of large size, compact in their forms, and having a good portion of fertile soil; most o them possessing convenient navigable streams, with a fair prospect o mineral resources.

According to this division, the State of Iowa should be bounded b the Mississippi on the east, by a parallel of latitude passing through th mouth of the Mankato or Blue-earth river, by a certain meridian lin running between the 17th and the 18th degrees of longitude on the wes and by the northern boundary of the State of Missouri on the south These limits would embrace about forty to forty-two thousand squar miles, with a proportionable capacity to sustain a corresponding population. It would give to the State a depot on the St. Peter's river, whil the Des Moines and Iowa rivers, running through its more central southern parts, would make the whole Territory, excepting the small portio drained by the tributaries of St. Peter's river, assume the character of a extended valley, with nearly all its streams flowing in one general direction, to contribute their share to the mighty Mississippi. As the population would be composed of emigrants from all parts of the civilized world, by not extending the boundary so as to estrange one portion of the people from the other, on account of a difference of origin, or a differen course of trade, they would be brought to live contentedly under th same laws and usages; whilst the uniform direction of the waters, together with the similarity of climate, soil, resources, and avenues to market, are well calculated to give to the inhabitants of this State a homogeneity of character and interest highly conducive to their well-being, both morally and politically.

SKETCH

OF

THE EARLY HISTORY OF ST. LOUIS.

[The following "sketch of the early history of St. Louis" was prepared by Mr. Nicollet as a part of his report; but as he died without assigning to it the place he desired it to have in the report, it is here published immediately after Part I.]

If I may be permitted to speak of the city of St. Louis as of an impersonated existence, I would say that she was born French; but, put under the charge of a step-mother, her cradle was hung up in the forest, her infancy stinted by its unavoidable privations, and her maturity retarded by the terror of the Indian yell. Her youth was more calm, but still not prosperous; for the exercise of undue constraints in youth sickens and retards the development of manhood. Abandoned subsequently by her Castillian guardians, she found herself reclaimed by her old parent, only to be once more repudiated. She had then, however, attained her majority, and had herself become a parent; whose children, born under the ægis of Liberty, opened for her a new destiny, and vowed that she should become the metropolis of a new empire.

In 1762, Mr. d'Abadie, then director general as well as civil and military commander of Louisiana, granted to a company of merchants of New Orleans the exclusive privilege of the fur-trade with the Indian nations of the Mississippi and Missouri rivers. This company bore the title of the firm of Pierre Ligueste Laclede, Antoine Maxan, & Co. Thus commissioned, the company lost no time in fitting out an expedition, well supplied with all the necessary articles for Indian trade, and which were to aid in forming new and permanent establishments on both rivers.

Mr. Laclede, the principal projector of the company, and withal a man of great intelligence and enterprise, was placed in charge of the expedition. Leaving New Orleans on the 3d of August, 1763, he arrived at St. Genevieve three months afterwards—namely, on the 3d of November.

At this period the French colony, established sixty years before in the Illinois, was in a prosperous condition. It had increased in importance since the year 1732, at which time France was beginning to realize the great idea, so long conceived, of uniting Canada to Louisiana by an extensive line of military posts, to be supported by several principal forts, the strategic positions of which were admirably selected. Fort Chartres, built on the flat now known by the name of the *American bottom*, was one of these main fortified places. But when Mr. Laclede arrived in the country, Louis XV had already signed the everlastingly shameful treaty of peace, by which was most inconsiderately ceded to Great Britain one of the finest regions on the habitable globe, the possession of which had been obtained after nearly a century of efforts and discoveries, and at the sacrifice of much blood and money. This region of country, embracing what are now the two Canadas, the immense watery expanse of the

Northern lakes, and the rich domains of Illinois, Kentucky, Tennessee, Mississippi, and of East Louisiana, to the Gulf of Mexico, passed under the dominion of Great Britain.

The Mississippi river thus became the natural limit between the French and British possessions, with its navigation declared free to the two nations. At this time, the French establishments were on the east side of the Mississippi, particularly those made in Illinois. The small village of St. Genevieve alone was on the right side, in which Mr. Laclede could scarcely find a house of sufficient size to store a fourth part of his cargo. On the other hand, the director general of Louisiana had received orders to deliver up the territory on the left side of the river; so that the British authorities might be expected at any moment, presenting themselves to take possession of it. In the midst of these difficulties, Mr. Laclede, greatly embarrassed under the new aspect of things, found himself, however, relieved when the commanding officer, Mr. Neyon de Villiers, allowed him the use of the stores at Fort Chartres, until the final surrender of the place. Laclede gladly accepted the offer, and lost no time in apportioning his squad and distributing his flotilla along the rivers, so as to render them most effective either for defence or for trade.

Having accomplished that preliminary arrangement, it became necessary to look out for the position of a central establishment. The left bank of the river no longer presented any fit situation, since the whole territory of Illinois had been passed over to the British Government; the village of St. Genevieve, on the right bank, being his only alternative, and this situated at too great a distance from the mouth of the Missouri. Mr. Laclede, therefore, left Fort Chartres, on a voyage of exploration to the junction of this river with the Mississippi, and was not long before he discovered that the bluff upon which St. Louis now stands was the spot that would best answer the purposes of the company.

Deferring, for the present, a more particular account of the geological situation of St. Louis, it may be remarked in this place that the hill upon which the city is situated is composed of limestone rocks, covered by a deep deposite of alluvial soil of great fertility. The limestone bluff rises to an elevation of about 80 feet over the usual recession of the waters of the Mississippi, and is crowned by an upland, or plateau, extending to the north and west, and presenting scarcely any limit to the foundation of a city entirely secure from the invasions of the river. At the time referred to, this plateau presented the aspect of a beautiful prairie, but already giving the promise of a renewed luxuriant vegetation, in consequence of the dispersion of the larger animals of chase, and the annual fires being kept out of the country, since the arrival of the whites on the Illinois side. At present, this new growth is again doomed to destruction; but the process is carried on with more discernment, and for a more praiseworthy object; it is for the extension of the city, for the erection of manufactories, for clearing arable lands—in short, for all the purposes of a progressive state of civilization.

Still, to be more particular in the description of this location, the slope of the hills on the river-side was covered by a growth of heavy timber, overshadowing an almost evergreen sward, free from undergrowth, and which terminated gently in a point on the very margin of the river, at a place corresponding to the spot where the old market-house now stands. The Mississippi was very deep, but a great deal narrower than it is now, it is stated by the old inhabitants that persons could converse with each other across it, without effort. It was on this spot that the prescient mind of Mr. Laclede foresaw and predicted the future importance of the town to which he gave the name of St. Louis, and about which he discoursed, a few days afterward, with so much enthusiasm, in presence of the officers at Fort Chartres. But winter had now set in, (December,) and the Mississippi was about to be closed by ice. Mr. Laclede could do no more than cut down some trees, and blaze others, to indicate the place which he had selected. Returning afterwards to the fort, where he spent the winter, he occupied himself in making every preparation for the establishment of the new colony.

Accordingly, at the breaking up of winter, he equipped a large boat, which he manned with thirty hands. It is proper to mention, in this place, that Mr. Laclede was accompanied by two young creoles of New Orleans, Auguste and Pierre Chouteau, of high intelligence, in whom he reposed the greatest confidence, and from whom he derived much assistance. These two young men, who never afterwards quitted the country of their adoption, became, in time, the heads of numerous families; enjoying the highest respectability, the comforts of an honorably acquired affluence, the fruit of their own industry, and possessed of a name which to this day, after a lapse of seventy years, is still a passport that commands safety and hospitality among all the Indian nations of the United States, north and west. Mr. Laclede gave the command of his boat to Auguste, the elder of the two brothers, who died in 1836; and it is with mixed feelings of veneration and filial affection that, at the moment of recording these events, (1842,) I have the satisfaction of believing that my respectable and esteemed friend, Pierre Chouteau, is still alive, in the full enjoyment of his faculties, at the ripe old age of 86 years.

Auguste Chouteau, who had accompanied Mr. Laclede in his first excursion, was directed to carry out his plans; and on the 15th of February, 1764, had arrived at his point of destination, with all his men, whom he immediately set to work. The present old market-place of St. Louis is the spot where the first tents and log-cabins were pitched, upon the site of this now important city of the West. Mr. Laclede being detained at Fort Chartres in the settlement of his private affairs, and in anticipation of the arrival of the British troops, thought it necessary, however, to pay a visit, early in the ensuing month of April, to his pioneers; and, finding everything in good train, contented himself with leaving such instructions as were best fitted to develop the resources of the location, and returned to Fort Chartres, with the intention of removing thence the goods belonging to the company.

I feel loth to describe here the dreadful effect produced upon the French colony of Illinois by the treaty of peace of 1763, referred to above; yet it seems to have caused still more dissatisfaction among the Indian tribes of the North, who for a long time refused to abide by it. In truth, the colony expired of a natural death. Several of the poorer inhabitants of the villages of Fort Chartres, Kaskaskia, Cahokia, and Vincennes on the Wabash, yielded to the new domination; whilst others preferred to follow up the fortunes of Mr. de Neyon, and accompany him to New Orleans. Others, again, crossed the Mississippi, adding their strength to the nascent colony of St. Louis.

But, on the 10th of October of the same year, (1764,) an incident oc-

curred, which threw the colony into great alarm. The remnants of th
Missouri tribe of Indians, who occupied an extensive prairie upon th
left bank of the river of the same name, suddenly made their appearanc
before St. Louis, numbering in all more than four hundred individuals
men, women, and children, and counting over one hundred warrior
Although they did not present themselves in hostile array, still they be
came troublesome by their importunate demands for provisions, and thei
more vexatious pilferings. Unable to foresee what would be the resul
of this unexpected visit, the colonists of Illinois, who, abandoning th
British dominions, had flocked to join those of St. Louis, took the alarm
and recrossed the Mississippi. Auguste Chouteau thus found himse
reduced to his original company of thirty to thirty-five men, from who
he despatched a messenger to Mr. Laclede, who was still tarrying a
Fort Chartres. Laclede arrived; and the result of his negotiation wit
the Indians proves that he had a great knowledge of the Indian charac
ter, and possessed much tact in managing it.

The chiefs, having appeared before him, addressed him in these term
"We are worthy of pity; for we are like the ducks and geese, seekin
some clear water upon which to rest themselves, and to obtain an eas
existence. We know of no better place than where we are. We wis
to build our wigwams around your village. We shall be your children
and you will be our father." Laclede here closed the talk, promisin
them a reply at a meeting to take place the next day; on which occasio
he addressed them thus: "You told me yesterday that you were like th
ducks and geese, who go on travelling until they find a fine country
where they can rest themselves and obtain an easy living. You told m
that you were worthy of pity; that you were looking out for a spot t
settle upon, and had not found one more suitable than this; that yo
would build your village around me; that we should live all together lik
friends. I wish to answer you like a good father; and I must say tha
if you imitate the ducks and geese, you follow guides that have no fore
thought; for if they had any, they would not settle on clear water, whe
they can be seen by the eagle, who would catch them. This would n
be the case were they to select a retired spot, well shaded by trees. Yo
Missouries, you would not be devoured by birds of prey, but by the R
men, who have been so long warring against you, and have already s
much reduced your numbers. They are at this moment not far fro
here, watching the English, to prevent them from taking possession o
these grounds. If they discover that you are here, they will kill you
warriors, and will make slaves of your wives and children. This i
what will happen to you, if, as you say, you mean to follow the examp
of ducks and geese, instead of listening to the counsels of men who r
fore. You, chiefs and warriors, think now, whether it is not more pr
dent that you leave here quickly, rather than be crushed by the superi
number of your enemies, in sight of your butchered old men, and you
women and children torn to pieces, and their limbs scattered to the dog
and vultures. Recollect that it is a good father who speaks to you
Meditate well what he has said, and come back to-night with your a
swers."

Accordingly, towards evening, the whole nation, in mass, presente
itself, announcing that it had determined to follow his advice; yet,
ceremony, asked him to take pity upon their women and children, a

liciting provisions for them, and powder and shot for the warriors. Mr. Laclede acceded liberally to their prayer, and the day following the next the unfortunate remnants of the Missouri nation ascended the river of their fathers, and returned to their village.

All anxieties being now dissipated, the colonists of Illinois, recovered from their alarm, returned to add numbers to the new colony. Lands were allotted to them, which they set about tilling, and upon which they built their cabins.

There being, so far, no indications of the arrival of the British, Mr. Laclede had deferred the translation of his establishment from Fort Chartres to St. Louis. He, in consequence, returned to the fort, as much for the sake of superintending his commercial affairs, as with the expectation of increasing the number of inhabitants for his new colony. In this expectation he had been encouraged by circumstances that had occurred during the summer, in consequence of the treaty.

It may be proper to state here, that when Mr. Neyon de Villiers received orders to evacuate the possession of the left bank of the Mississippi, he had under his command the troops at Fort Peoria, on the Illinois river; those of Fort Massiac, (not Massac, nor Massacre,) on the Ohio; and those stationed at the post of Vincennes, on the Wabash; although the last were under the more immediate command of Mr. St. Ange de Bellerive. It would seem that, at this time, there were no garrisons at Kaskaskia, Cahokia, and the Prairie du Rocher; these three villages being supposed sufficiently protected by Fort Chartres. Mr. de Neyon ordered all these posts to be evacuated, with the view of concentrating their garrisons about himself. There was, besides, a fort situated on the Kansas river, about four hundred miles above the mouth of the Missouri; and another had been commenced on the Osage river, near the old village of the same name. These two positions were not included in the treaty, as being situated on the west side of the Mississippi; nevertheless, orders were also sent to their garrisons to come down to Fort Chartres. All things being thus disposed of, Mr. de Neyon left Mr. St. Ange de Bellerive, one captain, two lieutenants, and forty men, to guard the fort until the time of its surrender. On the 10th of July, 1764, he descended the Mississippi with his own troops, some civil officers, and a large number of the inhabitants of the village of Fort Chartres and of the Prairie du Rocher. These people had been prevailed upon to follow Mr. de Neyon by a promise to obtain for them, at New Orleans, a grant of lands in Lower Louisiana, where they would be under a more immediate French government, and at a distance from their enemies, the English, who were termed by them "the heretics," &c. This national feeling was perhaps laudable, and he, no doubt, would have been welcomed at New Orleans; but it so happened that, upon the arrival of the convoy, a sad and fatal rumor was circulated, that the rest of both Upper and Lower Louisiana, west of the Mississippi, was about to be transferred to the Spanish Government. Besides, the local French Government interested itself very little about Mr. de Neyon, and those unfortunate families who had abandoned their homes and valuable lands under a delusive expectation of bettering their condition. After remaining a long time unsettled at New Orleans, their means nearly exhausted, some retired to the Opelousas and the Attakapas, whilst others reascended the Mississippi, on their return to Illinois and St. Louis. Then it was that Mr. de Neyon was censured. It was pretended that he had been actuated by motives of ambition, and the desire of giving himself importance on his arrival at New Orleans, by exhibiting in the persons of his deluded followers the deep regret which his departure had occasioned in the bosoms of the inhabitants of Illinois, in the hope of thereby rising to some elevated function.

This appears to have been the opinion of Mr. Laclede, who had always endeavored to retain these families, by the offer of certain and immediate advantages, as a set-off against promises the fulfilment of which depended upon a thousand contingencies. On this subject he explained himself to Mr. de Neyon in no measured terms. But the influence of the latter prevailed. This did not prevent the high-minded Mr. Laclede from acting as the friend and benefactor of those whom misfortunes drove back to seek his protection. He distributed among them lands and provisions, aided them with laborers, and furnished them the means of transporting, by land and by water, whatever they had preserved, or had previously abandoned in their first removal. Thus the colony of St. Louis received the accession of all those that emigrated from the left side of the Mississippi. The village of Fort Chartres was completely deserted, there remaining only the small garrison of the fort. The inhabitants destroyed their houses; not, however, in a feeling of spite, but to avail themselves of whatever could be transported and appropriated to their new establishments.

In the meanwhile, the second year after the signature of the treaty of peace had elapsed, and the British had not yet been able to take possession of Illinois. This was owing to the opposition made by several Indian tribes, who, as alluded to above, had refused to abide by the treaty, and were waging a most cruel war against the British. These tribes had formed a confederacy, under the command of Pontiac, a bold warrior, who had already become celebrated for his prowess, and his devoted attachment to France during the whole of the war which the latter had carried on against Great Britain, in America. The confederated Indian army was composed of Hurons, Miamis, Chippeways, Ottawas, Pottawatamies, Missouries, &c., &c. The name of Pontiac was the terror of the whole region of the lakes; and, by his bands, he effectually interrupted the British intercourse with the rest of the nations that had remained friendly to that Government. The taking of Fort Michilimackinac, the attempt at Detroit, and the attack upon the schooner Gladwin, on Lake Michigan, are memorable events, evincing a spirit of cunning and daring highly characteristic of the genius of the red man.

In the winter of 1764–'65, Pontiac, whilst engaged in his acts of depredation, learned that an armed British force was about to start from New Orleans, to take possession of the left bank of the Mississippi. He immediately proceeded to the neighborhood of Fort Chartres, accompanied by 400 warriors, to oppose this occupation of the country; and, finding there some Illinois Indians, who had placed themselves under the protection of the French garrison, he proposed to them to join him. But these people, disheartened by recent calamities, and, as it were, foredoomed to a final extinction, were unwilling to assume a hostile attitude towards their new rulers, from whom interest, if not generosity, would lead them to expect the same protection which they were then receiving. To this refusal Pontiac replied, with characteristic energy: "Hesitate not, or I destroy you with the same rapidity that fire destroys the grass of the prairie. Listen, and recollect that these are Pontiac's words." Having then despatched scouts upon the Mississippi and the Ohio, he hastened with some of his warriors to Fort Chartres, where he addressed Mr. St. Ange de Bellerive in the following terms:

"Father, we have long wished to see thee, to shake hands with thee, and, whilst smoking the calumet of peace, to recall the battles in which we fought together against the misguided Indians and the English dogs. I love the French, and I have come here with my warriors to avenge their wrongs," &c., &c. Mr. de St. Ange was a Canadian officer of great bravery, and too much sense to be seduced by this language. Besides, he knew too well the Indian character, to lose sight of the fact that the love of plunder was probably, at bottom, a stronger inducement for Pontiac than his love for the French. This visit, which was terminated by an exchange of civilities, might, nevertheless, have brought difficulties upon the small garrison of Fort Chartres. But news arrived that the Indians of Lower Louisiana had attacked the British expedition, some miles below Natchez, and repulsed it. Pontiac became then less active in guarding the rivers; and, as he believed that the occupation of the country had been retarded again, he and his party were about to retire altogether. During the time, however, that the news took to arrive, the British had succeeded in getting up another expedition, on the Ohio; and Captain Sterling, at the head of a company of Scots, arrived unexpectedly in the summer of 1765; taking possession of the fort before the Indians had time to offer any resistance. At this news, Pontiac raved; swearing that, before he left the country, he would retake the fort and tear away Captain Sterling's scalp. But the intervention of Mr. St. Ange and Mr. Laclede put an end to these savage threats. Pontiac returned to the north, made peace with the British, from whom he received a pension, and seemed to have buried all animosity against them. But, by his restless spirit, he soon aroused new suspicions; and we are informed by Captain Jonathan Carver, that Pontiac having gone, in the year 1767, to hold a council in the Illinois country, an Indian, who was either commissioned by one of the English governors, or instigated by the love he bore the English nation, attended him as a spy; and being convinced, from the speech Pontiac made in the council, that he still retained his former prejudice against those for whom he now professed friendship, he plunged his knife into his heart as soon as he had done speaking, and laid him dead on the spot.

Captain Carver travelled through the northern region, but never was south of the Prairie du Chien; so that his information is probably incorrect. The celebrity of Pontiac, as well as the distinguished part he took in the Indian wars of the West, will justify me, therefore, for introducing here a somewhat different statement of the manner of his death, as I have it from two of the most respectable living authorities of the day—Col. Pierre Chouteau, of St. Louis, and Col. Pierre Menard, of Kaskaskia. It is as follows: Pontiac's last residence was in St. Louis. One day he came to Mr. de St. Ange, and told him that he was going to pay a visit to the Kaskaskia Indians. Mr. de St. Ange endeavored to dissuade him from it, reminding him of the little friendship that existed between him and the British. Pontiac's answer was: "Captain, I am a man! I know how to fight. I have always fought openly. They will not murder me; and if any one attacks me as a brave man, I am his match." He went off; was feasted; got drunk; and retired into the wood, to sing his medicine songs. In the mean while, an English merchant, named Williamson, bribed a Kaskaskia Indian with a barrel of rum, and the promise of a greater reward if he could succeed in killing Pontiac. He was struck with a pakamagon, (tomahawk,) and his skull fractured, which caused his death. This murder, which aroused the vengeance of all the Indian tribes friendly to Pontiac, brought about the successive wars and almost total extermination of the Illinois nation.

Pontiac was a remarkably well looking man; nice in his person, and full of taste in his dress, and in the arrangement of his exterior ornaments. His complexion is said to have approached that of the whites. His origin is still uncertain; for some have supposed him to belong to the tribe of Ottowas, others to the Miamis, &c.; but Col. P. Chouteau, senior, who knew him well, is of opinion that he was a Nipissing.

At last, on the 17th of July, 1765, Mr. de St. Ange de Bellerive surrendered the country, and passed over to St Louis, with his troops and the civil officers. This arrival was a favorable event for the organization of the colony. St. Louis became the capital of Upper Louisiana, under the command of Mr. de St. Ange, who had charge of the execution of the laws and ordinances by which the French possessions were governed.

But Louis XV, in 1763, had entered into another treaty, by which he ceded to Spain the rest of his possessions in North America. This treaty, which filled the measure of French losses and humiliations, had been kept secret for a year. The official news of it was only received at New Orleans on the 21st of April, 1764, and rumors of it soon reached Upper Louisiana. Such was the consternation with which it was received by the whole French population, that the grief it occasioned to Governor D'Abadie became the cause of his death, and Aubry, his successor, had to announce the cession to the people. The serious troubles which, in consequence of this cession, were brought on at New Orleans under the Spanish captain general, Don Antonio d'Ulloa, and the tragic events which followed under his successor, the blood thirsty General Oreiley, kept the administration of Upper Louisiana in the hands of the French for several years. It was not until the 11th of August, 1768, that Spanish troops could take a first possession of St. Louis. But, eleven months afterwards, in consequence of the events alluded to, the same troops had been compelled to evacuate the country. At last, quiet being restored in Lower Louisiana, the Spaniards, in 1770, returned and took definitive possession of St. Louis. Mr. de St. Ange was then an old man. He decided upon remaining in St. Louis, where he died in 1775, at the age of 76. He had long commanded the post of Vincennes, on the Wabash, before he was called to take charge of Fort Chartres; and, being highly respected and beloved by the inhabitants, his death was deeply regretted.

When Mr. Laclede arrived in the country, there were no Indians on the spot where St. Louis now stands, nor in the whole region between the Mississippi and what is now the southern part of the State of Missouri. The Illinois Indians never crossed the river; so that the new colonists were never visited but by the Missouri and Osage Indians, and always as friends. The Missouries had become familiar, and had got the habit of spending their summers with the French. They came down n their canoes, bringing along with them their wigwams, and located themselves near St. Louis; their women aiding the colonists in their rural occupations, and in building their houses. The Osages visited the place three or four times a year, but not in a body. After a while, all the other northeastern nations adopted the same custom; and even the Sacs and Foxes, after the destruction of the Illinois nation, having driven away the Peorias, who were the last remnants of this nation, came in to trade away their maple-sugar, their pecans, &c.

The Peorias, after having been expelled from their village on the Illinois river, took refuge at Kaskaskia. Afterwards, they fled below St. Louis, on the spot where the arsenal is now located; and, the British no longer occupying Fort Chartres, although the country still belonged to them, they again took refuge there, and, under the American Government, their hunting grounds were in the vicinity of St. Genevieve. It was, however, on the prairies of Kaskaskia that they were finally destroyed by their enemies, and by the use of ardent spirits. The last attack upon them by the Sacs and Foxes, and other allied tribes, must have taken place between 1800 and 1804.

Had St. Louis been destined to remain a village, her history might have been despatched in a few lines. But future generations will inquire of us all that concerns the origin of the "River Queen," the destined queen of the western empire. Having so far sketched its early history, it becomes necessary to record the principal events connected with the city and its vicinity.

In 1767, a man by the name of Delor [illegible] settled upon a splendid amphitheatre on the right bank of the Mississippi, six miles south of St. Louis. He was soon followed by others; but, as they were not overburdened with wealth, they used to pay frequent visits to their kinsfolk of St. Louis, who, on seeing them approach, would exclaim, "Here come the empty pockets,"—"*voilà les poches vides qui viennent.*" But, on some occasion, a wag remarked, "You had better call them *empties of pockets*,"—*des vide-poches*; a compliment which was retaliated by those upon the place of St. Louis, which was subject to frequent seasons of want, by styling it *Pain-court*—short of bread. The village, being still nameless, retained the appellation of Vide-poche until 1776, when it was changed into that of Carondelet.

In 1769, settlements were made on both shores of the lower portion of the Missouri river. Blanchette, surnamed "the hunter," built his log-house on the hills called *les Petites Côtes*; being the first dwelling of the beautiful village that, in 1784, received the name of *St. Charles*.

François [illegible] Dunegan commenced the village of *Florissant*; which name it still popularly retains, although more lately called by the Spaniards St. Ferdinand.

About the same time, François Saucier originated the establishment of the *Portage des Sioux*, on the bank of the Mississippi, seven miles above the mouth of the Missouri.

In 1778, on the 20th of June, Pierre Ligueste Laclede, the founder of St. Louis, died in the village called the *Poste des Arkansas*, on Arkansas river. Mr. Laclede had continued to reside in St. Louis. His house, situated in what is now Main street, between Market and Walnut streets, and opposite the old market, became, after his death, the property of the late Col. A. Chouteau, who enlarged it, adorned the premises with a fine garden, and erected that splendid mansion lately admired by strangers, as well as by the inhabitants of the city. It was pulled down in the month of October, 1841; and might be regretted, did it not make room for more modern buildings, better suited to the commercial extension of the place. Laclede still continued to deal in furs, which traffic obliged him to make frequent voyages to New Orleans. It was during one of these voyages, whilst ascending the Mississippi, that he became so ill as to be stopped at the Post of Arkansas, where he died, at the age of 54. He had never been married; and not having had time to realise the fortune which his enterprise and intelligence could not have failed to secure to him, his property was sold after his death, in liquidation of his affairs.

In 1780, on the 6th of May, as I discover by the papers of the late Col. Auguste Chouteau, intrusted to me by the family, (though some writers assign the year 1778,) St. Louis was attacked by a party of Indians and British, who had been ordered to take possession of the town on the west side of the Mississippi, in consequence of the part which Spain had taken in favor of the independence of the United States. The French, who had preserved a good understanding with all the Indian nations, very little expected this blow, and were not prepared to resist it. The garrison consisted of only 50 to 60 men, commanded by a certain Captain Lebas, (a Spaniard, and not a Frenchman, as his name might lead one to suppose.) But, whatsoever his origin, he deserves nothing but public contempt. This Lebas, during the first three years that the Spaniards occupied the country, had commanded a small fort somewhere towards the mouth of the Missouri—perhaps at *Belle Fontaine*—and afterwards received the command of St. Louis, as a successor to Cruzat, who himself had succeeded Piernas. The only means of defence for the place, at that time, was a stone tower erected near the village on the bank of the Mississippi, and some weak palisades. There were not more than 150 males in the place, of whom not more than 70 could be relied upon as efficient to repel an enemy numbering, according to the best authorities, 900 combatants; though, by some, their number is represented to have been from 1,400 to 1,500. It would have been useless to propose a capitulation, the conditions of which the Indians, (as has been unfortunately too often experienced,) either from ignorance or treachery, never fulfil; and the inhabitants knew too well the character of those with whom they had to deal, to expect salvation in anything but a courageous resistance. The women and children, who could not take part in the defence, took shelter in the house of Auguste Chouteau; whilst all those, both men and women, who were within the palisades, commenced so vigorous a resistance, that the enemy was forced to retreat. But these, with characteristic ferocity, threw themselves upon those of the inhabitants who, engaged in the cultivation of their fields, had not had time to reach the palisades; and it is said that 60 were killed, and 13 made prisoners.

It is averred that the Spanish garrison took no part in this gallant defence. Lebas and his men had betaken themselves to the stone tower; and it is further stated, that, as the tower threatened to give way after the first fire from it, he ordered the firing to be stopped; and that he died on receiving information that the Sacs, Foxes, and Iowa Indians were massacring the people on the plains. The year this attack took place, is called by the French *l'Année du Grand Coup*—the year of the great blow.

Historical accuracy demands a denial here of the assertion of some authors, who ascribe to American troops an active part in this defence. Unfortunately, there were no United States troops on the bank of the Mississippi opposite to St. Louis, as none were needed, there being nothing to guard or to defend. It is well known that General George R. Clark, with his men, then occupied the important post of Kaskaskia, which is more than 56 miles S. E. of St. Louis; and that, consequently, this gallant officer could not have had time, even if it fell within his line of duty, to aid in an affair that concerned the Spaniards and the British, which was planned as a surprise, and lasted but a few hours.

It was probably on this occasion, or perhaps on a similar one, that took place in the summer of 1811, as tradition informs us, that, after the battle, the Indians being reproached by the French that their women had been indiscriminately murdered by them, replied: "But why did they not wear their blue kerchiefs about their heads, as they used to do formerly? we would have recognised and spared them."

After the event narrated above, the inhabitants of St. Louis, finding that their garrison were unworthy of trust, without ammunition, and without means of defence against a regularly-organized attack, deputed Mr. A. Chouteau to proceed to New Orleans for assistance. Cruzat was again made commander of St. Louis, the affairs of which place he administered with mildness and public satisfaction. A wooden fort was built on the most elevated spot within the city, upon which were mounted several heavy pieces of ordnance; and still later there were added four stone turrets, from which cross-fires could be kept up. This might have answered for the protection of the city, but only against the Indians. No traces of this fortification are now to be seen—the very site of which has yielded to the improvements of the city.

It may be well to remark, in this place, that this event proves the policy that has prevailed in Canada and Louisiana, in granting lands to the colonists, whereby they were commanded not to scatter themselves, but to concentrate into villages, under the protection of the forts; thus combining for mutual labor as well as mutual defence. Hence the Government ceded tracts of lands for a whole community, on condition that they should be worked in a body. There was first a field assigned, the extent of which was proportioned to the number of families in the village. To each family was allotted a certain portion for cultivation, and all contributed to its general enclosure. Another tract was laid out for the pasturage of the stock; and a third in wood-land. These concessions were called *common lands*, or simply *commons*. There were yet, a few years ago, such commons in the neighborhood of St. Louis, Carondelet, St. Genevieve, Kaskaskia, and near almost all the French villages in Missouri and Illinois.

1785.—This year is called *l'Année des Grandes Eaux*—the year of the great flood. In the month of April, the waters of the Mississippi rose 15 or 20 feet above the highest mark they had ever been known to reach at St. Louis, and at some narrow parts of the river as high as 30 feet. The whole region of country drained by the Mississippi to its mouths, presented the aspect of an immense sheet of water studded with islands. The villages of St. Genevieve, Fort Chartres, Kaskaskia, St. Philippe, Cahokia, &c.,

were totally submerged; and the inhabitants, who had fled to the hills that overlook the rich bottom, interchanged visits by water from the rocky bluffs of the right side of the river to the hills that border the Kaskaskia. The village of St. Genevieve was then situated on a low prairie, that has since been entirely washed away; and tradition has it, that Mr. Auguste Chouteau, on his way back from New Orleans, moored his boat, and breakfasted with his men, on the roof of the most elevated house.

In 1788, the traders between St. Louis and New Orleans having been frequently attacked and plundered of their merchandise, on their return, by the band of *Mississippi pirates*, headed by Culbert and Magilbray, who used to lay in wait for them at the mouth of the *rivière aux Liards*, (*Cottonwood creek*,) the Governor of New Orleans took measures against them, and ordered the equipment of an armed convoy of ten boats, which succeeded in breaking up the haunt of the pirates, and returned in triumph to St. Louis. This year is called *l'Année des Dix Bateaux*—the year of the ten boats.

In 1797, several Spanish galleys, of 40 oars, ascended the river to St. Louis, with troops, under the command of Colonel Don Carlos Howard.

1799 to 1800.—Winter of very intense cold, but no actual observations of temperature recorded.*

In 1801 the small-pox, (called by the creoles *picote*,) made its appearance, for the first time, in the country of Illinois and Missouri. The disease was unknown in the country on the 15th of April of this year.

By referring to the dates above, it will be seen that Upper Louisiana was for nearly thirty-two years under the dominion of Spain, and that France had scarcely the time to be aware of the foundation of St. Louis. The colony was ruled by a military government—that is to say, by the arbitrary will of commanders, uniting all authority in themselves, without any guaranty of personal rights, scarcely that of petitioning.

Spain never seems to have sought to take advantage of the resources of Upper Louisiana. It would appear that she looked upon this vast region simply as a barrier against the encroachment of neighbors upon her supposed more valuable Mexican possession—a policy which alone explains the indifference which she manifested in the government of the country for so many years. Yet a nation becomes great by its genius; and the part which Spain has played in the history of nations does not allow the suspicion that she was ignorant of these resources. When she took possession of the entire country west of the Mississippi, she found a French population already acclimated, civilized, and brought up in hardships endured during its prolonged wars with the British and Indians, and accustomed to sufferings and to privations. The prospects of a more tranquil and easy existence had assembled these people on the Arkansas, the Mississippi, and the Missouri rivers, where they awaited only a protecting government that would permit them in security to develop their industry, and to take advantage of the peace then enjoyed by the whole western region. All that Spain had to do was to open markets for their produce, and they would have supplied her with those provisions which she was obliged to ask of strangers for the nourishment of her southern colonies. By encouraging the cultivation of lands, naturally of easy tillage, varied in their character, fertile, and, in some respects, exhaustless, the population would have increased, the arts of civilization would have found their way among the people, who would have gradually been led to entertain a filial regard for their new parents; and thus would have arisen to the north of Mexico an empire whose enlightened strength would constitute the best of barriers. This vast empire, possessing the grandest natural limits on the earth—bounded by the Mississippi, the Missouri, and the Pacific Ocean—might, by its immense preponderance, have changed the course of those great events that have taken place on the new continent since that period. France could not have aimed at such a power, so long as she was in possession of Canada; but she ought to have thought of it the day when she surrendered that great colony. The mighty results obtained by the free institutions of the United States of America demonstrate, at this day, that the loss of Canada might have been turned to advantage by France; and that, by fostering the possessions which she still held on the west of the Mississippi, she would have soon been amply repaid for the sacrifices she was compelled to make in 1763, since the colony, which remained to her, had still three times the extent of her own kingdom. Such was the opinion of enlightened men in France. The celebrated statesman Turgot more especially foresaw the advantages of such a policy, and submitted to the King a plan by which this vast region (called by him Equinoxial France) might be largely peopled in a short time. But he was treated as a visionary.

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* This was the second winter of the sort experienced at St. Louis. During the former one, in 1768, the cold had been so intense as to destroy the orange trees in Lower Louisiana, and the banks of the Mississippi were covered with ice.

This great scheme of policy, which would have been easy for France to pursue, acquired importance in its adoption, and was of still more natural execution by Spain. But, instead of eagerly seizing upon it, she is contented to encircle the settlers between the Mississippi, the Missouri, and the Indians; imposes upon them arbitrary government; throws obstacles in the way of a free communication with the neighboring people; establishes restrictions upon imports, prohibits foreign competition, and stops the tide of emigration, by requiring of those who present themselves, offering their industry and talents, a certificate that they belong to the Roman Catholic religion. Spain adopts also the impolicy of granting exclusive favors and privileges; makes grants of land without discrimination, often unconditionally; and when conditions are annexed, the grantee is unable to fulfil them, for want of proper encouragement, and from the uncertainty of finding a market for the products of his labor. No wonder she complains that her colony costs her more than it yields; and she would make up the deficiency by driving the population to dig out of the earth by main bodily strength, without the aid of arts, metals of which she reserves for herself the monopoly, as well as that of the salinas.

If we look over the voluminous records of laws and ordinances by which the country was then governed, it is painful to consider the futility of the subjects to which they refer, and the littleness of the motives which have induced their passage. No settled plan ever seems to have been adopted with a view of developing the moral and natural resources of the country. As the Government seemed to provide only for the exigencies of the day, so the inhabitants lived but for the day. It is true there are no evidences that the Spanish authority in Upper Louisiana was ever used with cruelty or oppression, or that it was even vexatious; but it was, perhaps, worse—for it was enervating, and drove to apathy.

Man, however, obeys the impulses of his faculties, as matter is governed by its peculiar properties. The creoles of Upper Louisiana were the descendants of a brave and enterprising nation. Unable to devote their energies to more noble pursuits, or to cultivate the arts of civilized life, they penetrated into the forests, in the midst of numberless tribes of Indians till then unknown, to explore the extensive regions between the Mississippi and the Rocky Mountains, and thus created the fur-trade of this great portion of North America. In these hazardous, distant, and prolonged journeys, was trained a set of hardy men, from whom sprung the class of men known by the name of *voyageurs*, or *engagés*, who were for a long time, and still are, as necessary and efficient on the burning prairies of the West, as the Canadian voyageurs are for the rugged and frozen regions of the North and Northwest. These two haughty and indomitable races have a peculiar character; they are half civilized and half savages; rebellious and submissive; possessed of great courage and power of physical endurance, they fear neither the inclemency of seasons, the pains of hunger, the arrows of the Indian, nor the danger of exposure to wild beasts; never despairing, and always cheerful, they are intelligent, honest, devoted, and gifted with the warmest feelings; they speak, as it were unconsciously, the idioms of the several Indian tribes among whom they have been; they know all the rivers, all the paths and by-paths, and all the recesses of the wilderness; they are intimately acquainted with the character and wants of the Indians, and possess a good knowledge of the haunts and habits of the wild animals: in a word, they are a class of men with whom no military or scientific expedition, no trading caravan, no traveller of any description, can dispense.

It was these first explorers who, under the direction of their employers, whom they called their *bourgeois*, (boss,) opened the fur-trade to the north and west of the Missouri river. Such were the certain advantages offered by this trade, because of the natural facilities of the country in affording shorter and easier means of transportation over the British trade, that, had it been well organized and fostered, it would have made a flourishing place of St. Louis, and established a formidable competition capable of destroying all the influence of the British Company. But the Spanish system was fatal to those great interests. To trade with the Indians was a privilege nominally granted as a reward for services rendered, but, in fact, generally adjudged to the highest bidders. A few merchants only amassed fortunes; whilst the colony derived from it no permanent advantage. Far from this, the natural resources of the country were more and more neglected. Such was the fertility of the soil, that it might have been made the granary of all the Spanish possessions at the south; and yet scarcely as much grain was raised as answered the wants of the surrounding country. The most active of the colonists had quitted their fields for the precarious profits of the fur-trade; all the young men turned trappers, hunters, or boatmen; and the peace and contentment of a domestic life were exchanged for one of bustle and adventure. The contrast between the two shores of the Mississippi was obvious. The right shore was marked by listlessness and apathy; whilst the protecting government of Great Britain, although but recently established, had already infused prosperity into the settlements of the left. A wholesome lesson might have been learned in this contrast; but it was disdained. The colony fell into complete idleness and poverty; and the habits and manners of the inhabitants became, of course, deteriorated, leaving it far in arrear of the progress which civilization was making around it. Towards the close of the last century, all activity and industry had vanished. "People," says a French writer, "worked only to keep themselves from dying and going barefooted, and seemed satisfied with living out a life of carelessness and ignorance, as unprofitable as it was inglorious."

Spain, however, at that time appeared to arouse herself in behalf of her Mississippi possessions. The Marquis de Carondelet was still the governor general at New Orleans, and Mr. Charles Dehault Delassus lieutenant-governor of St. Louis. Being both enlightened men, they were aware "that the admission of foreign settlers of every creed was one of the most certain means of promoting the prosperity of their provinces;" and they might at another epoch have effected much good, but it was then too late—the times were completely altered. During the precious years lost by Spain, the nations of the two parts of the world had had their feelings roused for the love of liberty. The Americans had achieved their independence; France had commenced her revolution. If, during these years, the Spanish Government, preoccupied at home, had deemed it its best policy to wait for a more propitious occasion to turn a serious look towards Louisiana, it could not fail now to perceive the error. The progress of events, in its onward march, had arrived at that stage when the next step was to change the entire destinies of this magnificent country.

On the 9th day of July, 1803, at 7 o'clock p. m.—and the precision with which this date is registered indicates the profound sensation with which the news was received—the inhabitants of St. Louis learn, indirectly at first, that Spain had retroceded Louisiana to Napoleon, and that the latter had *sold* it to the United States.

It most generally happens that the state of transition in a nation, from a monarchical form of government to one of almost absolute liberty, is one of prolonged struggles. Those nations that have gone through this ordeal know that it can be passed but at the expense of blood, shed in intestine commotions and foreign wars. But, in this respect, the two Louisianas have been more fortunate, for it only required a few years of schooling. It is true, the Upper Louisiana had to pay higher for her tuition; but this is in the nature of things, for the knowing will always outwit the inexperienced. The good-natured Missourians had not kept pace with the march of civilization. Their existence had become, as it were, so isolated and simplified, that they had lost sight of the advantages of a social compact, which, whilst it imposes salutary restraints, invites emulation and stimulates ambition. There were no public schools in the colony; no regular church, as it was but rarely that the villages were visited by some venerable missionaries, whose number was very small, considering the vast extent of the country. All the purposes of life were embraced within the domestic circle, where virtue, religious faith, and strict honesty were proverbial. Notaries public, lawyers, judges, and tribunals were unknown. There was no other prison than the guard-house of the small Spanish garrison; and it is asserted that, during upwards of thirty years, there was not a solitary instance of civil delinquency, or of crime. Bargains were sealed by a grasp of the hand, and the currency of the country consisted of deer-skins. This state of things did not so much grow out of a relapse to the original condition of those by whom they were surrounded, as of innate candor and simplicity. Old Anglo-Americans who lived among them in these times, and have experienced and enjoyed their heartfelt hospitality, cherish the recollection of them with sincere respect. It is true, that those colonists who engaged themselves in the Indian trade, and were always under arms, as well as those who navigated the rivers, in the transportation of articles of barter, and were most of their time tugging at the oar or handling the *cordelle*—these, certainly, did not exhibit the same unexceptionable simplicity of manners; but such people were almost always absent from the villages. They were birds of passage to their own families; and though, in the pursuit of their several professions, they could not fail to encounter much that was exceptionable and bad, it is hardly to be presumed that they would poison with it their own firesides.

The French descendants of the present day still retain numerous anecdotes of their ancestors, that graphically describe the unsophisticated nature of the Missourians; among which I may be permitted to select one.

A genuine Missourian, it is related, was hovering for some time around the stall of a negro dealer, situated on the bank of the Mississippi, in Lower Louisiana. The dealer was a Kentucky merchant, who, observing him, asked him if he wished to purchase anything? "Yes," said the Missourian, "I should like to buy a negro." He was invited to walk in, made his choice, and inquired the price. "Five hundred dollars," said the dealer; "but, according to custom, you may have one year's credit upon the purchase." The Missourian, at this proposition, became very uneasy; the idea of having such a load of debt upon him for a whole year was too much. "No, no," said he, "I'd rather pay you six hundred dollars at once, and be done with it." "Very well," said the obliging Kentuckian, "anything to accommodate you."

But to return to the narrative of events. The treaty having been finally ratified on the 30th of April, 1803, Captain Amos Stoddard took possession of the country, which the Spanish troops evacuated on the 3d of November, 1804. Somewhat later, W. H. Harrison, Governor and commander-in-chief of the Indian territory and of Upper Louisiana, organized the judiciary and civil powers; and on the 2d of July, 1805, General James Wilkinson, by order of Congress, established the district of Upper Louisiana under a Territorial Government, which was called Missouri Territory. By this name it was known until 1820, when it was admitted into the Union as the State of Missouri, and its constitution sanctioned by Congress in 1821.

It is easier to imagine than to describe the astonishment and wonder of the good colonists, when, as a sequel to the sundry official acts by which they were declared *republicans*, and their country a member of the great American confederation *founded by Washington*, they witnessed the arrival of a legion of judges, lawyers, notaries, collector of taxes, &c., &c., and, above all, a flock of vampires in the shape of land speculators. The simple-minded creole could not at first exactly realize the sort of liberty which made it a duty, or compelled him, to leave home to go to elections, and to serve as a juryman. St. Louis, however, was the capital of the Territory, by which the feelings and opinions of the other parts of the colony had been directed; and there were among her citizens men of intelligence and capacity, whose example and influence prevailed over the natural repugnance that always arises in the adoption of a radical change in the political condition of a country. Liberty, with the popular institutions that accompany her, were welcomed; their advantages were soon understood; and perhaps no other instance can be found of the amalgamation of a people with a great nation with so much ease and tranquillity.

What follows to be told of the history of St. Louis is a part of that of the State of which it is now the emporium. It belongs to the local historian to make known the rise and progress of her institutions, under the promoting care of Liberty; foremost among which, he cannot fail to distinguish the noble example of public spirit set by the Catholic clergy, who were the first to establish throughout the country numerous institutions for worship, charity, and public instruction. But, before quitting my narrative, I cannot refrain from alluding to the actual condition of St. Louis, and indulging in the prospect of her future greatness.

The geographical position of the city is favorable to a remarkable degree. Situated a few miles below the junction of two of the greatest rivers of the world, it is the natural central depot of all the varied products that reach it by a navigation of one thousand to two thousand miles over these two rivers and their innumerable tributaries. St. Louis is emphatically the key of the Far West; comprehending within this term the extensive regions stretching between the Mississippi and the Pacific ocean. All distant expeditions to the north, or to the west, must start from St. Louis; and here, also, all their fruits are gathered together, comprising the proceeds of the fur-trade, as well as the mineral and agricultural productions of the whole northern basin of the Mississippi; whence they are distributed to the various markets of consumption, either by the Mississippi to the Gulf of Mexico, by the Ohio to the Atlantic States, or through Illinois, by the lakes and other opened channels of communication, to the seaboard and the Canadas.

It is worthy of remark—and her geographical position makes it obvious—that no works of internal improvement can be made by any of the neighboring States, whether to the east or north, or even by those that may hereafter be formed to the north or west, without becoming subservient to the interests of St. Louis. Hence the State of Missouri has not deemed it wise to embark hastily in such expenditures; and though, in the true spirit of the time, much reproached on this score, events at this day prove that she acted judiciously. Submitting its great and magnificent territory to the natural and unburdened course of things, without the necessity of levying direct taxes, immigrants have been flocking for several years back to this rich and beautiful country, the resources of which they develop with astonishing rapidity. In 1830, the population of the State was only 140,445; that of St. Louis 6,500. In 1840, the census returned 382,702 as the whole number of the inhabitants of the State; and the population of St. Louis was estimated, in 1841, at 30,000 within the city limits. The amount of property taxed, according to the city register of the same year, was 8,591,675 dollars.

The first arrival of a steamboat at St. Louis was in 1819; there are now (October, 1841) no less than 67, of from 150 to 800 tons burden, belonging to the port. The whole number engaged in the navigation of the waters of the Mississippi and its tributaries, is 310,* most of which come to St. Louis in the course of the year. It was stated above, that Mr. Laclede, in 1763, took three months to come from New Orleans to St. Genevieve with his flotilla, a distance of 1,286 miles; whereas, it is not an uncommon thing now, for the larger steamboats to reach St. Louis, which is sixty miles above, in five or six days. Such facts say more than the most eloquent pen could describe.

In concluding this historical sketch, a sad reflection involuntarily arises. Is it not surprising that, during the thirty-two years that Spain had possession of Upper Louisiana, the province was never settled by native Spaniards, excepting the officers who ruled over it, and a few fur-traders? The inhabitants were French, or the descendants of French from Canada or Lower Louisiana; and the Spaniards have left no remembrances of themselves, saving their land register; no institutions, no works, not a single monument of public utility. Doubtless, the golden treasures buried in the mountains of Mexico and of South America were too alluring to allow emigrants to be tempted from them, and engage themselves in the labors of agriculture, in the rich valley of the Mississippi. But, taking a retrospect when Spain was the greatest of maritime powers; when, during the reign of Ferdinand and Isabella, her navigators discovered new worlds, giving her an empire on which the sun never set; when the great armada struck terror in the bosom of the haughty Elizabeth,—it becomes painful to think how ephemeral is the ascendency even of the bravest and most prosperous nations! how truly rapid their decline and fall!

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* A list of these steamboats was published in October, 1841, giving the name and tonnage, the date when, and the place where built. Most of them were built in the valley of the Ohio, from 1835 to 1841, inclusive.

PART II.

1. Determination of *altitude* by the barometer.—The ordinary methods of levelling are slow, laborious, and sometimes almost impracticable, in mountainous countries. Hence it is, doubtless, that we have so long neglected to collect facts relative to the elevation of different regions of the earth's surface above some fixed level, such as that of the ocean. But, now that science has placed within the reach of everybody the admirable instrument known as the *barometer*, has rendered it so applicable to the measurement of heights, and has so perfected it as to be capable of results whose precision can be all that is desired, observations by it are being multiplied everywhere; persons learned in sciences and arts are becoming contributors; and we have reason to hope very soon for great advancement in the knowledge of the *relief* of the surface of the earth—a knowledge indispensable for civil and military purposes, for physical geography, for geology, and for topography.

Impressed with the importance of this subject, I should have been wanting to the plan I had proposed for myself, if, from the very commencement of my travels in the United States, I had not endeavored to add my contribution to researches in this regard, and in respect to which the country seemed to me almost (so to speak) untrodden. I was provided with several barometers and accessories; and I found them also, very commonly, in public institutions. I was yet in want of voluntary assistants. I found them always, readily, among the enlightened men who are spread in universities, in colleges, and in society; and from the year 1833, I was even able to institute a system of meteorological observations, taken four or five times a day, at different places, simultaneously with my own; which daily extended itself as I advanced farther and farther into the country I wished to visit, until it came to embrace a large surface of the territory of the United States; thus always affording me, in whatever part of the field of my operations I might be, some station with which I could compare my observations. Under this system has grown a considerable mass of observations; more than two-thirds of which yet remains to be calculated, and to appear hereafter, independently of such as I publish now, on the occasion of the map.

And here I cannot deny myself the pleasure of making public acknowledgments to the several persons who, in this particular, have given me their time, and honored me with their assistance; nor can I avoid the duty which obliges me, as I think, (and which I hope their delicacy will not be pained by my discharging,) to indicate them by name. Certainly, he who, in the measure of his opportunities and position, supports and furthers science, when it is being directly contributed to by the entire devotion and labor of another, merits, almost as much as that other, the gratitude of the public. Assured that every reader will partake of my sentiments on this subject, I shall, without further prelude or apology, acknowledge the services I have received, in this respect, from the Rev. A. Verrot, professor of mathematics and natural philosophy at St. Mary's College, Baltimore; the Rev. J. Wallace, professor in the university, Columbia, S. C.; my friend, Professor H. Guenebault, lately of Savannah, Ga., now of Charleston, S. C.; Doctors Milton Antony, Dugard, and Ford, of the Medical College in Augusta, Georgia; Dr. Henry Hull and Mr. J. Jackson, both professors in the university of Athens, Georgia; Mr. Frederick Dugar, of Georgia; Lieut. G. W. Long, Mr. J. Lewis, Col. A. Murat, and my friend L. Goldsborough, U. S. N., in Florida; my friend, the Rev. J. Lerne, and Mr. Girard, Mobile; the Rev. Mr. Tissot, in New Orleans; Professor J. Lee Bliss, in Natchez; Mr. J. Hamilton and Dr. G. Troost, both professors in the university at Nashville; Capt. J. Saunders, U. S. engineers, at Pittsburg; Capt. R. E. Lee and Lieut. Bliss, U. S. engineers, during their engineering operations at the Des Moines rapids, on the Mississippi; Mr. Henry H. Sibley and Major L. Taliaferro, at St. Peter's; the Revs. P. J. Smedt and Felix Werreydf, missionaries among the Pottawatomies at Camp Kearney, near Council Bluffs, on the Missouri; the late Rev. J. A. Vanseweevelt, professor of mathematics and natural philosophy in the university of St. Louis; last, my friend R. Paul, C. E., and Dr. G. Englemann, at St. Louis. The most of these gentlemen supplied me with months, and some with years, of meteorological observations, which are of the utmost importance to me; and the interest which they have taken in my labors, from the commencement, has often excited me to perseverance, under circumstances at times very little encouraging. But, to my highly esteemed friend, Dr. Englemann, my special acknowledgment is due for the great attention which he gave to the meteorological observations, for a period of more than three years.

Dr. Englemann is not only a gentleman eminent in his profession, but he cultivates, also, with great distinction, several branches of natural history; and it is gratifying to the scientific traveller, going to the west, to meet with a learned man such as Dr. Englemann;—always warmly disposed to assist him, and supply valuable information upon the country he is visiting.

The problem of the determination of altitudes above the ocean, is one of the most interesting subjects for investigation that present themselves in the vast field where pure mathematics are applied to physical phenomena. All know that the height of mercury in a barometer depends upon the weight of the air; and that this height lessens, the higher the observer is in the atmosphere. Of this simple relation between the barometric heights and the vertical space passed through, men of science have taken advantage, and have furnished formulæ and tables, by means of which the problem can be more or less exactly solved.

Among these methods there is one which recommends itself, particularly in practice, as procuring the greatest exactitude, and as being universal for all latitudes, and for all elevations above the sea;—I mean that of the illustrious author of the "Mécanique Céleste." The simple and convenient tables of Mr. Oltmann, which were constructed in accordance with this celebrated theory, are what I have used, throughout, in my calculations.[*]

There are two practical methods, with the barometer, for determining the altitude of a place above the sea. The first consists in ascertaining the *mean annual height* of the barometer, and the *mean annual temperature* of the atmosphere, observed during many years, at the same place. With these two elements, we deduce the absolute altitude of the place; starting with the conventional principle, that at the level of the sea the mean height of the French barometer is 0.7629 metre, and the mean temperature 12° 8′ centigrade; and of the English barometer, 30 inches, with a mean temperature of 62° Fahrenheit.

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[*] Nothing is wanting here, but the rigorous development of what is observed to be practically of some influence, but which has not yet been discussed in a manner conformable to the other portions of the theory;—I mean the varying pressure of the vapor, always in the atmosphere, according to its quantity and the temperature. But this does not require to be enlarged on now.

This method, because of its length, is not practicable for the traveller directly. The numerous observations which it demands belong, of course, to a regular and permanent system of meteorological observations, having a more extensive object in view, and rarely met but in the public institutions of large cities; so that, in fact, the traveller can only apply it as far as he may have the good fortune to come, in his route, upon some station where such a system has been established, and followed with good instruments and appropriate care. In such case, he avails himself of his good fortune to have the absolute height of the barometer at this station, and to refer to it all the heights he may measure, until his distance from it no longer admits his observations to be compared with those of the station.

Nevertheless, he should not fail to institute a stationary system of meteorological observations by himself, or by others, wherever he can find opportunity: independently of the immediate service that such observations render to meteorology, and a knowledge of the climate of the region, they become, in their continuance, useful some day to himself or to others, for the very method of which we have been speaking, and for its varied and important applications. The extension of this method, from the long time it takes, and the frequent observations it demands, will, doubtless, hereafter be fertile in great results in this branch of physical science.

In the philosophical study of nature, where we seek to determine the *laws* that govern progressive and variable phenomena, which are continually presenting themselves, we want chiefly *points of departure* well fixed, and observations made with care, to show us the vicissitudes of the phenomena, so as to connect the present and the past by numerical comparisons of determinate epochs. In this regard, I may use the words of the Nestor of scientific travellers, Baron Alexander Von Humboldt:

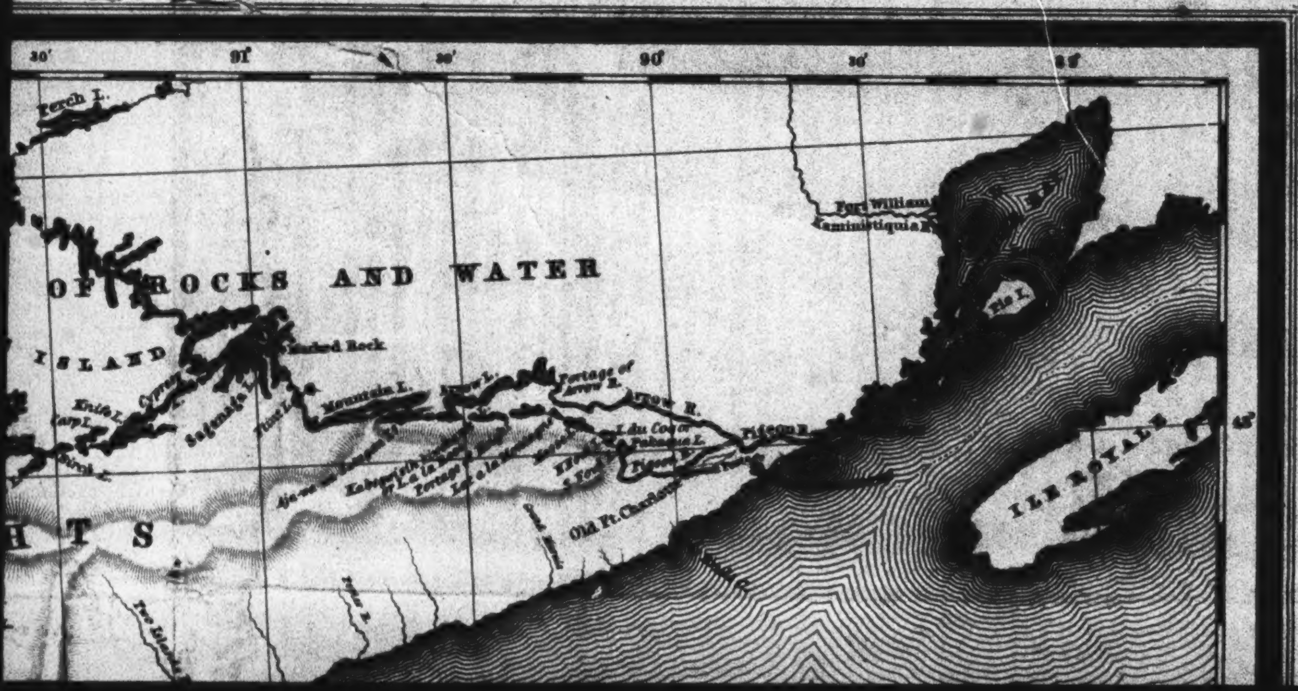
"If only in every thousand years the mean temperature of the atmosphere and of the earth, in different latitudes, could have been determined, or the mean height of the barometer at the shore of the ocean, we should know in what ratio the heat of different climates has increased or diminished, and if any change has taken place in the height of the atmosphere."

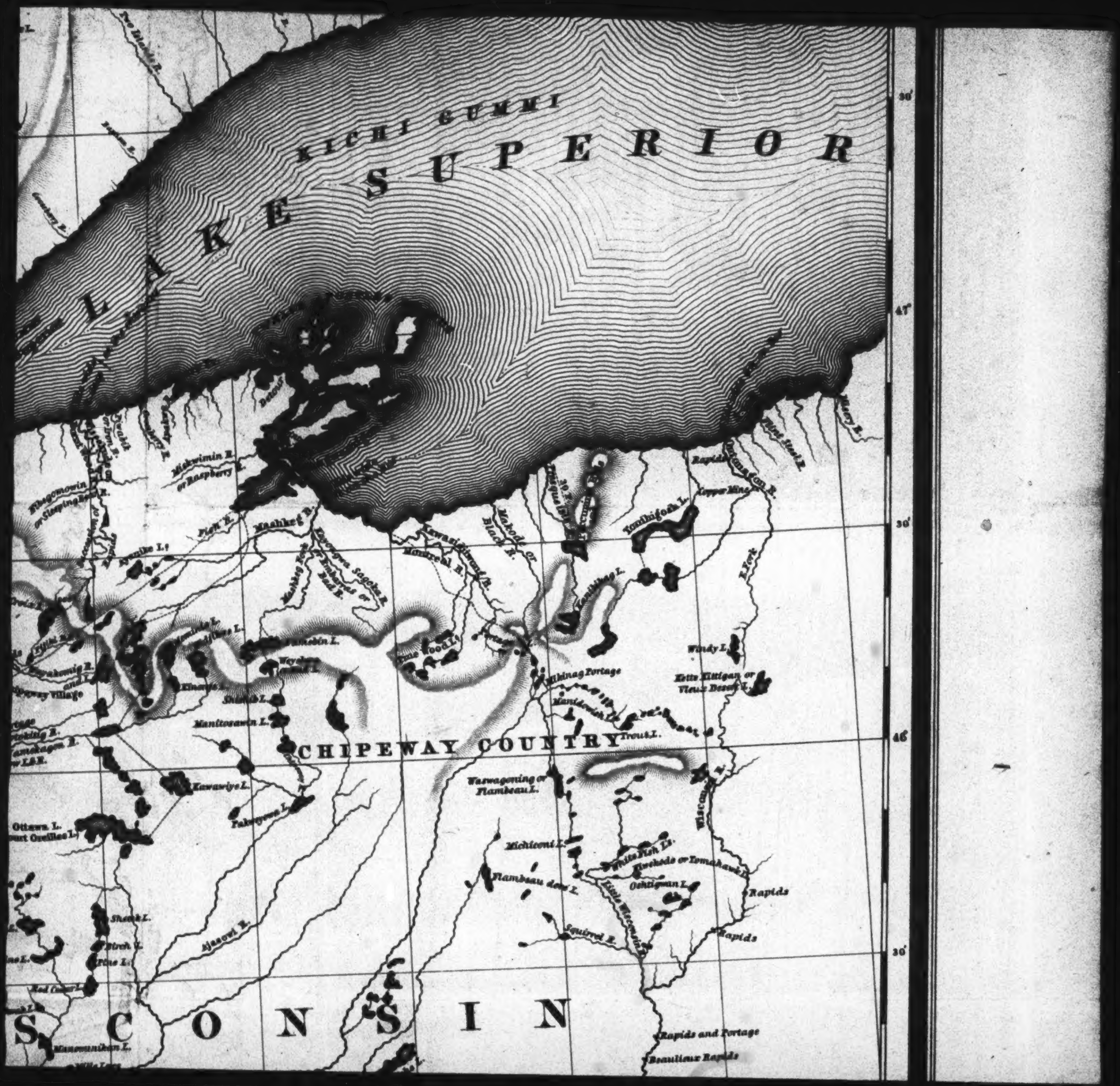
The second method is a *compound barometric levelling*, and consists in the comparison of the respective heights of the portable barometer with the height of a stationary barometer, set up at a point whose absolute altitude is known. Of course, the observations to be compared must be as much as possible corresponding and simultaneous. If the station where the portable barometer is observed be not very far distant from the other, which may be called the fixed station, simultaneous readings of the two instruments, and of their respective thermometers, every fifteen minutes, for several hours, are enough to furnish tolerably exact data for the difference of level, especially if the observations are favored by calm weather, with the instruments placed in the shade, and in isolated situations, so as to be exempt from accidental affection or local temperature.

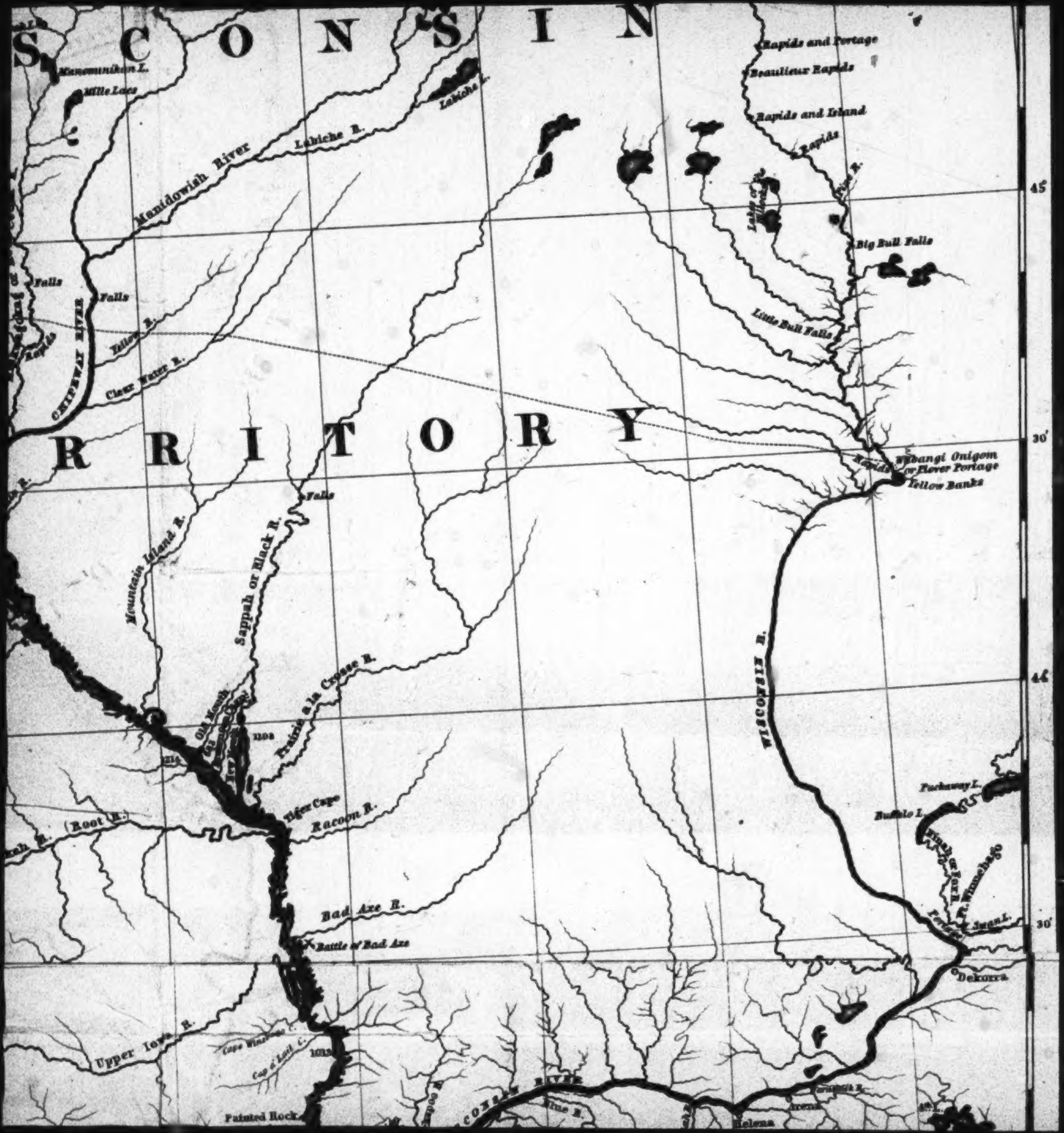
But the more remote the fixed and transient stations are from one another, the more the number of observations has to be augmented; and, instead of several hours, it may be necessary to devote several days, several weeks, and even several months, according to circumstances, of which the observer is naturally the judge. In all cases, however, he has it in his power to obtain differences of level almost as exact as he could procure them trigonometrically. In rugged and mountainous regions, *full of accidents*, levelling with the barometer will afford results preferable to those of trigonometric measurement.

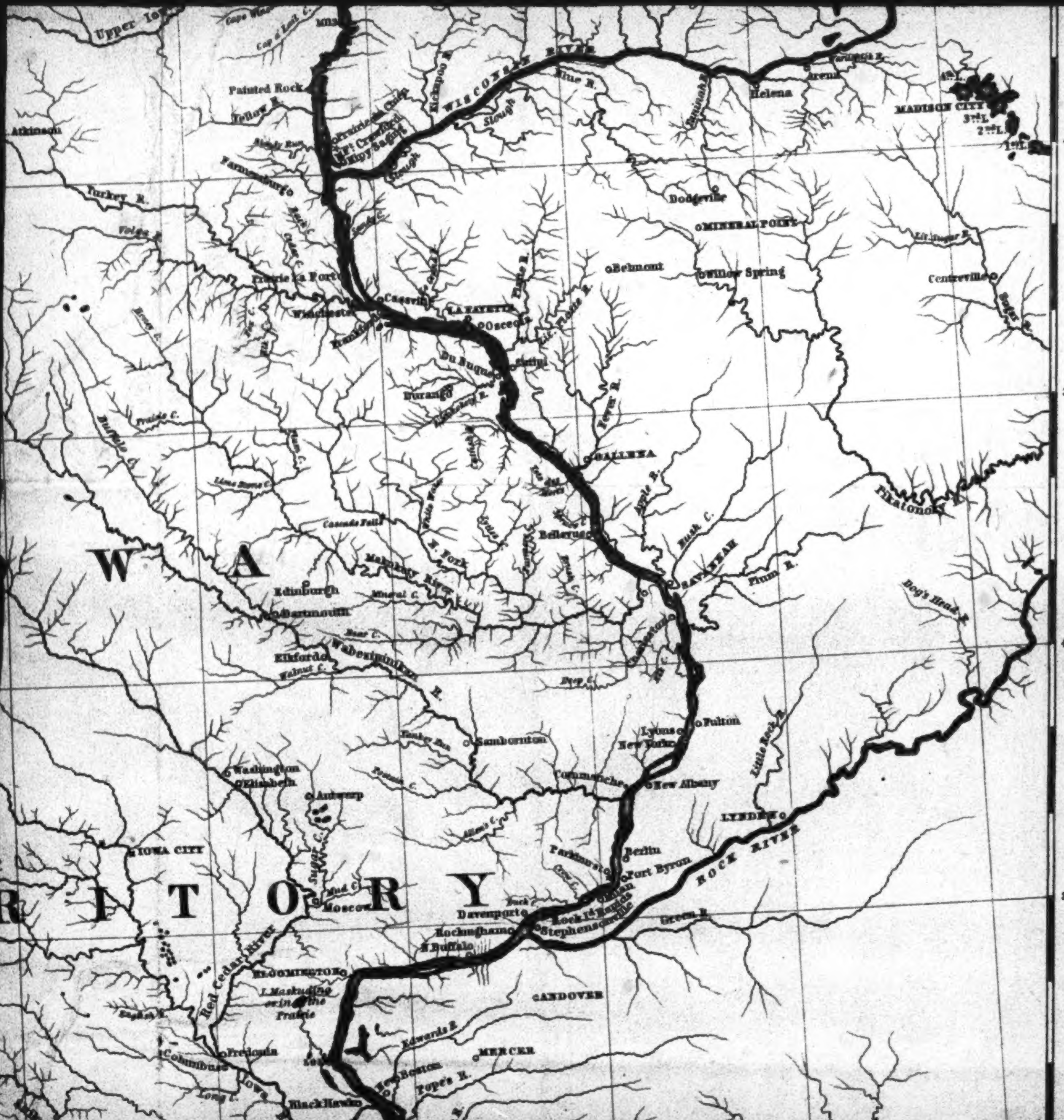
At first sight, to determine altitudes by the heights of the barometer, would seem to be a problem easily solved in practice. Those who think it really so, would, I apprehend, upon trial, find themselves deceived. There is, in fact, a crowd of considerations to be reflected upon, of attentions and care to be given, arising from and dependent on the construction of the instruments employed, and on the circumstances in which an observer finds himself placed—particulars which cannot be foreseen, much less prescribed in advance; that he only can estimate, and without the due estimation of which, observations apparently well made are, in reality, good for nothing. For instance: in the first place, the traveller must be familiar with all parts of his instruments; he must be able to repair them, in case of accidents, if they are reparable. He must, farther, be perfectly acquainted with the laws of meteorology relating to these instruments, that, in any movement or variation actually noticed, he may distinguish between what is the effect of accidental causes, or what is a regular and periodic movement. Then, to render the observations made at different stations duly comparable, it is necessary that the barometers and thermometers should have been compared one with another, respectively, both in advance and afterwards, if the last is possible; and that proper account be taken of their discrepancies in the reduction of the calculation. I need not speak of the additional corrections which have to be applied when the comparison is made between barometers of different manners of construction; as, for instance, between syphon and cistern barometers; or between those of the latter class, the level of whose cistern is relative, and those whose cistern is adjustable. Of course, I need hardly mention either the precautions which all and any of these instruments require in their transportation. The least negligence in this particular may give rise to permanent regret. Indeed, chronometers and barometers are inexhaustible sources of anxiety for the travelling geographer. I do not know moments of greater annoyance than those when one finds a chronometer *stopped*, or a barometer broken, just when he is about confidently to use them.

When the period for the calculation has arrived, comes first the discussion of the observations, which are to be compared—a tedious, but indispensable labor. In this the correspondence and simultaneity of readings have to be settled; care must be taken to compare with one another only those observations made under conditions of the atmosphere as nearly as may be similar; and the circumstances of the two stations, during the corresponding periods, are to be investigated, to see that the two instruments have been affected generally in the same manner. But such an entire accord cannot be hoped for when the question is to determine a difference of level between two points at a great distance, apart from a large number of corresponding observations. For these cases we

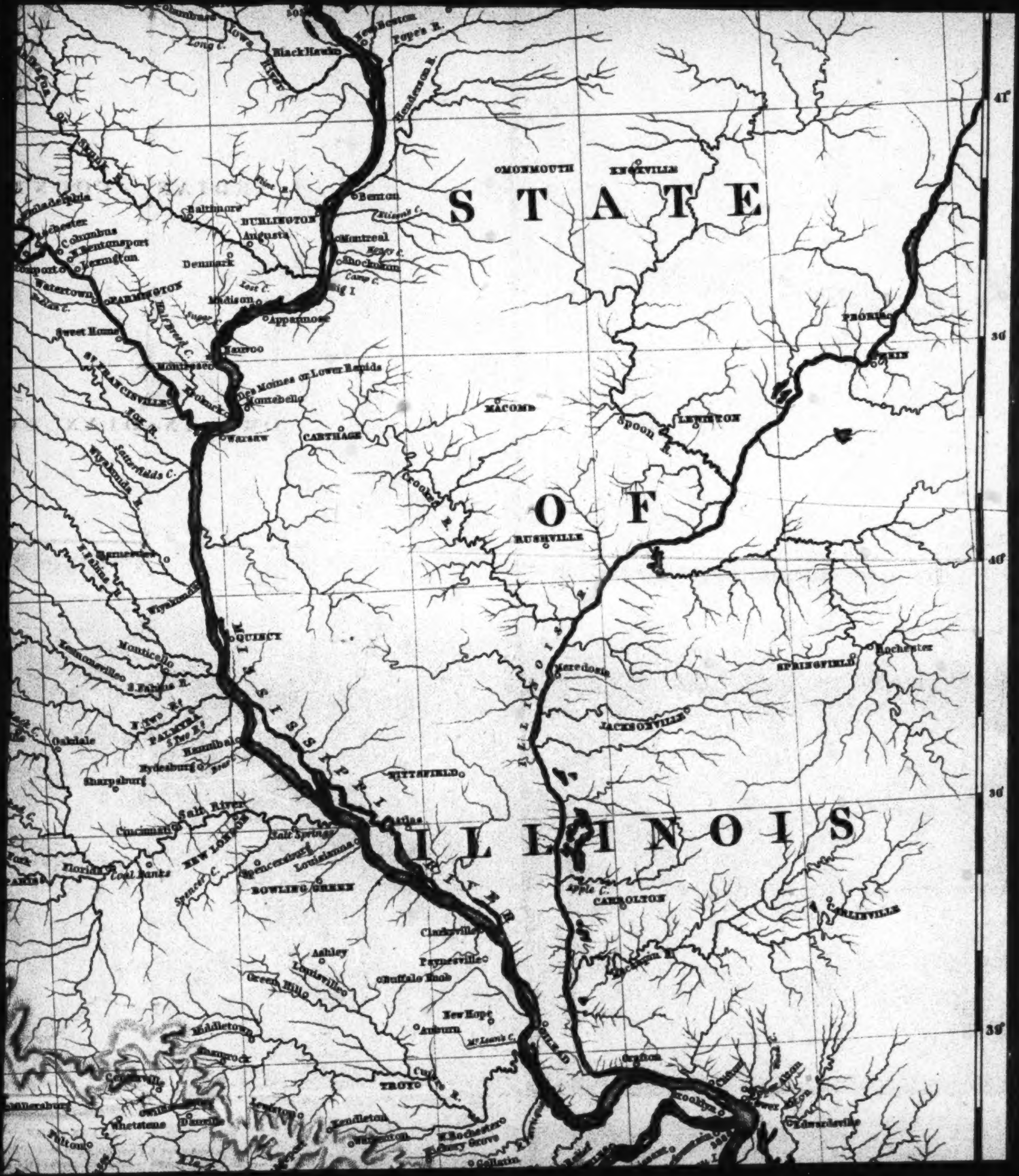

30'
91°
30'
90°
30'
89°
48°
Perch L.
OF ROCKS AND WATER
ISLAND
Marked Rock
Knife L.
Carp L.
Birch L.
Cypress L.
Saganaga L.
Mountain L.
Portage of Arrow R.
Arrow R.
L. du Coeur
Pigeon R.
Fort William
Kaministiquia R.
Pie I.
ILE ROYALE
Old Ft. Charlotte
HTS
Poplar R.
Two Islands R.

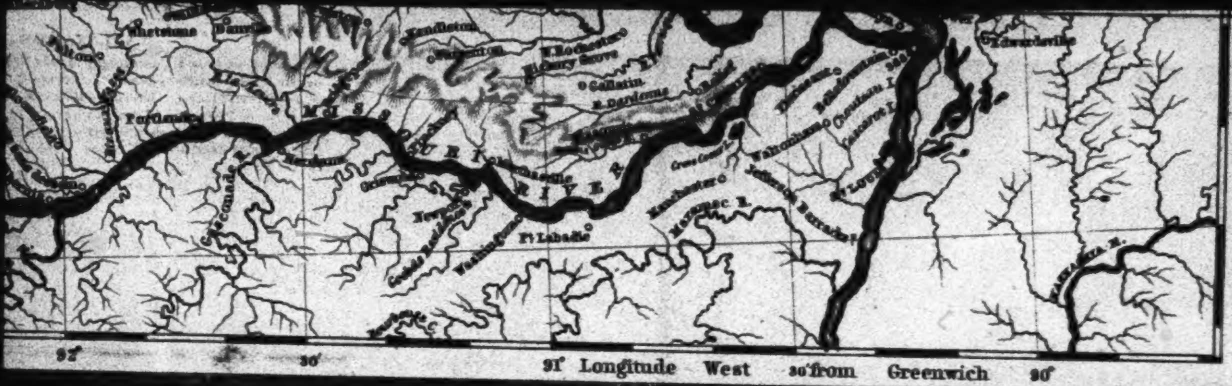

KICHI GUMMI
LAKE SUPERIOR
CHIPEWAY COUNTRY
SCONSIN
30'
47°
30'
46°
30'
Two Islands R.
Gooseberry R.
Detour
Iwabik or Iron R.
Gooseberry R.
Misery R.
First Steel R.
Ontonagon R.
Rapids
Copper Mine
Tonibigosh L.
L. Fork
Makode or Black R.
Trisque Isle R.
30 R.
Kawasikiwand R.
Montreal R.
Mashke R.
Fish R.
Miskwimin R. or Raspberry R.
Nibegomowin or Sleeping Bear R.
Kagaynga Sagaka R. or Embarras or Bad R.
Mashking R.
Pine Wood L.
Portage
Wayabun L.
Kinogo L.
Shabob L.
Manitosawin L.
Kawawiye L.
Pakwegwan L.
Ottawa L.
Court Oreilles L.
Shank L.
Birch L.
Pine L.
Red Cedar L.
Manomuniban L.
Chipeway Village
Nikinag Portage
Manidowish L.
Trout L.
Windy L.
Ketta Kitigan or Vieux Desert L.
Waswagoning or Flambeau L.
Michiconi L.
Flambeau dew L.
White Fish L.
Kochedo or Tomahawk L.
Oshtigwan L.
Little Wisconsin R.
Squirrel R.
Ajasowi R.
Wisconsin R.
Rapids
Rapids
Rapids and Portage
Beaulieux Rapids

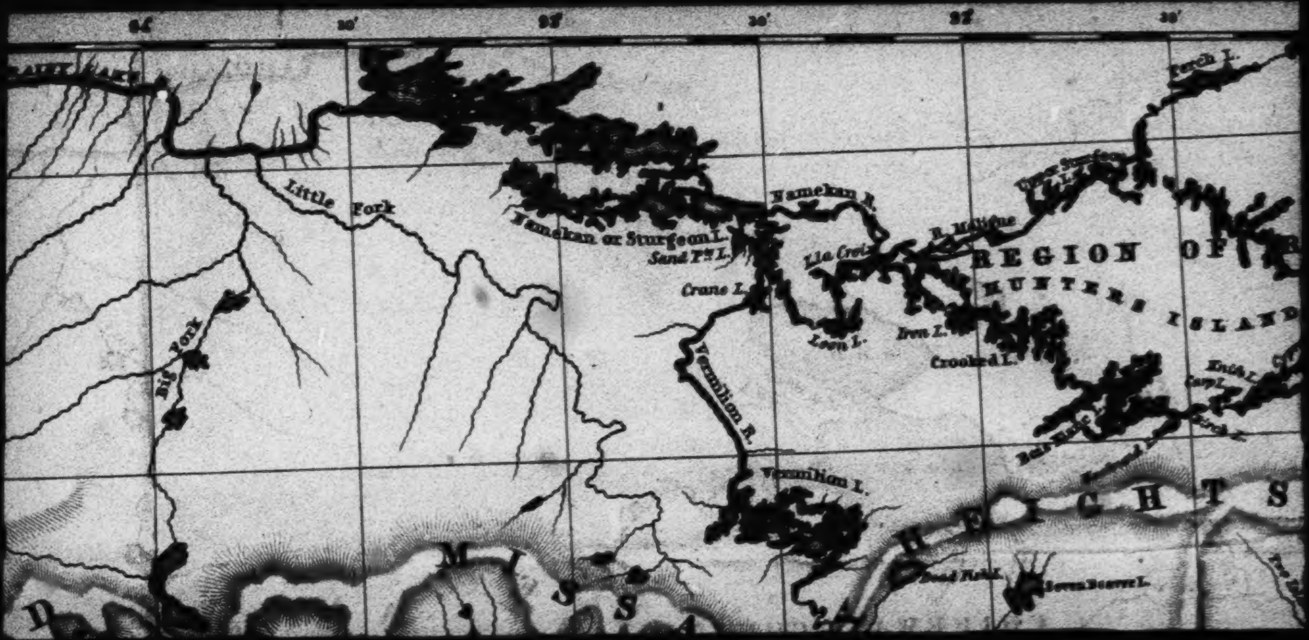

S C O N S I N
R R I T O R Y
Menomunikon L.
Mille Lacs
Lobiche L.
Manidowish River
Lobiche R.
Falls
Falls
Rapids
CHIPEWAY RIVER
Yellow R.
Clear Water R.
Rapids and Portage
Beaulieux Rapids
Rapids and Island
Rapids
Lake of the Islands
Big Bull Falls
Little Bull Falls
Wbangi Onigom or Flever Portage
Rapids
Yellow Banks
45
30'
44
30'
Falls
Mountain Island R.
Sappah or Black R.
Prairie a la Crosse R.
Old Mouth
1214
1198
Tiger Cape
Racoon R.
Root R.
Bad Axe R.
Battle of Bad Axe
Upper Iowa R.
Cape Winnebago
Cap à l'ail C.
1019
Painted Rock
WISCONSIN R.
Puckaway L.
Buffalo L.
Neenah or Fox R.
L. Winnebago
Swan L.
Portage
Dekorra
Helena
Arena
Blue R.
CONSIN RIVER

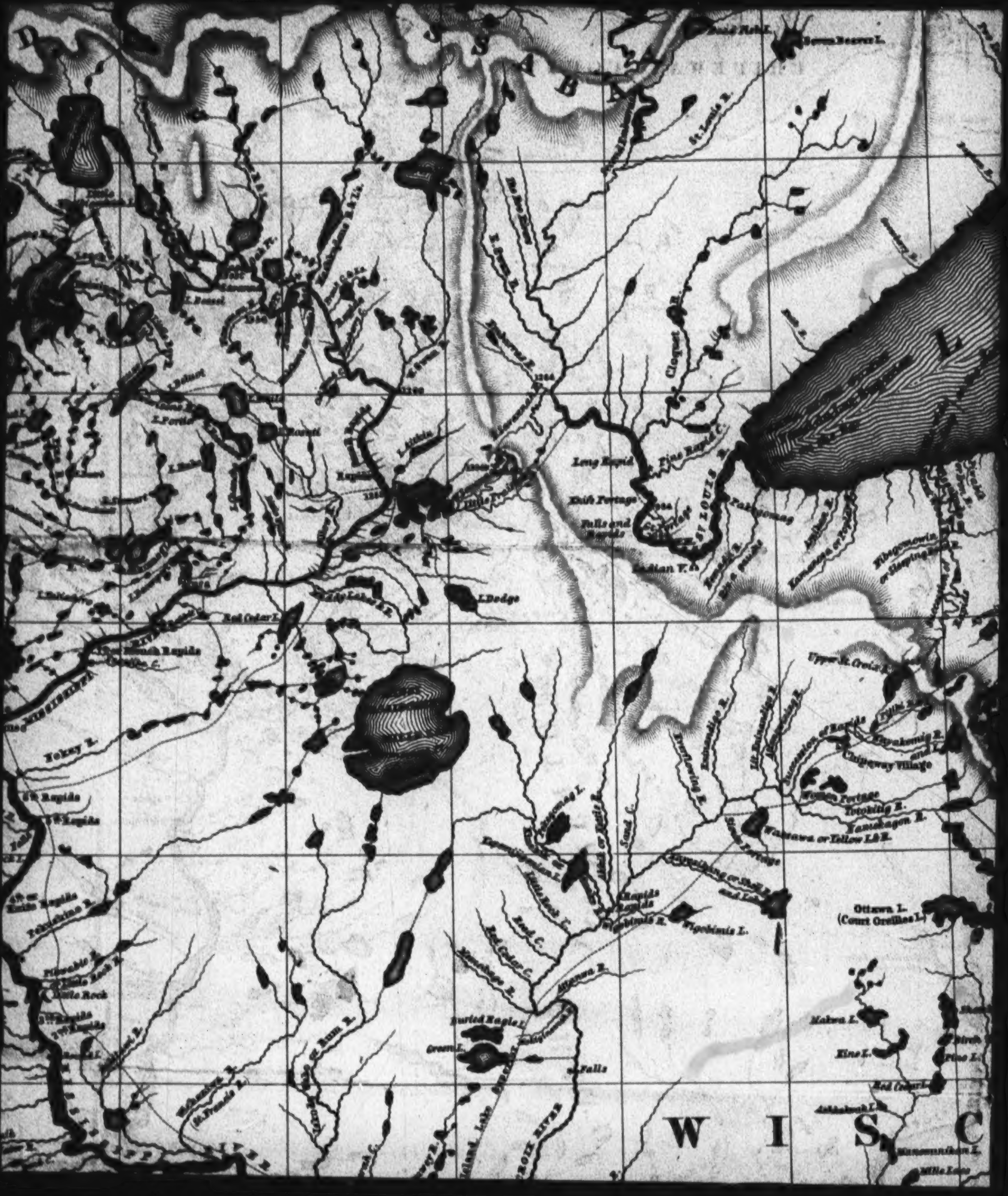


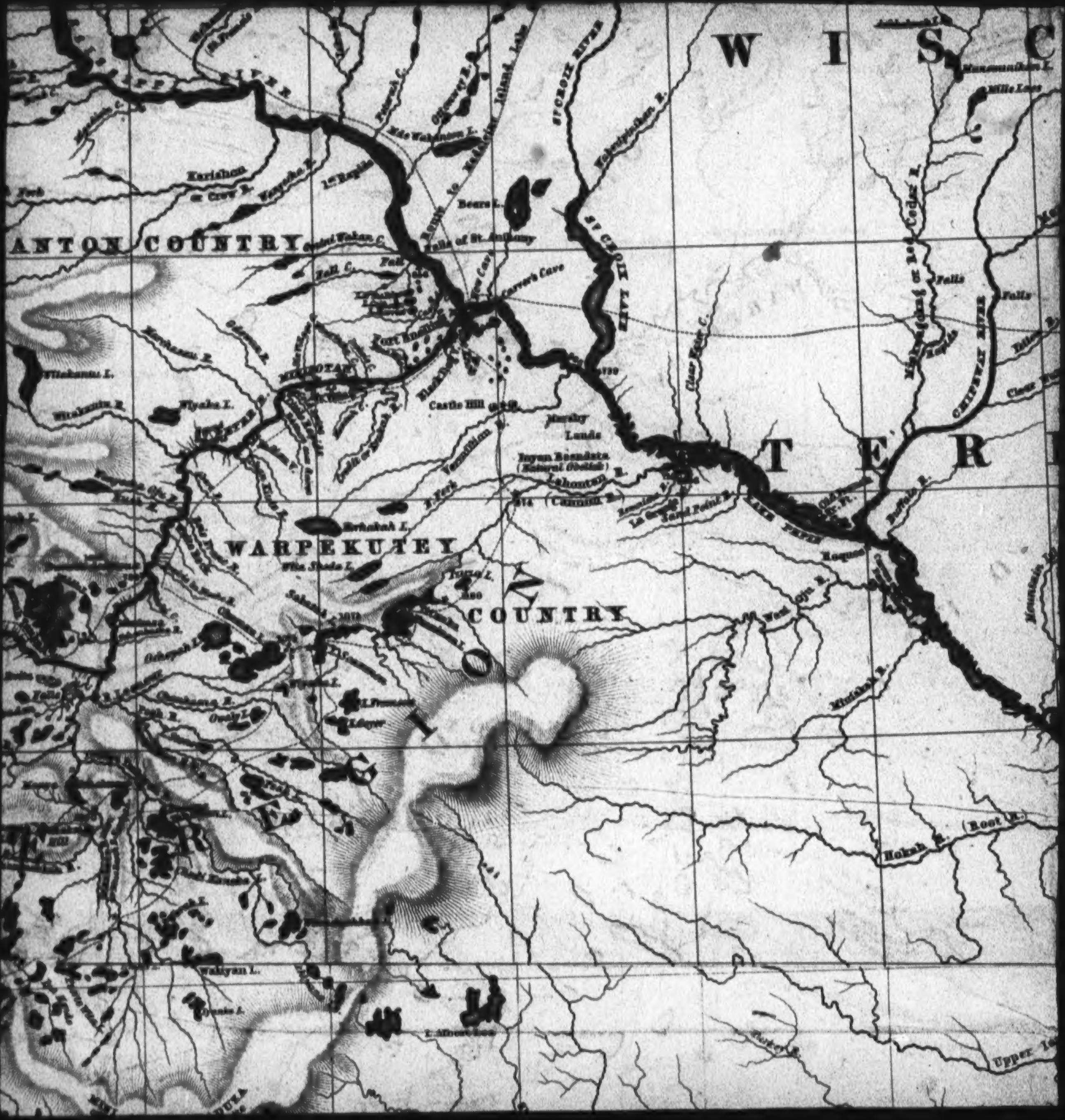
43°
30'
42°
30'
MADISON CITY
4th L.
3rd L.
2nd L.
1st L.
Helena
Arena
WISCONSIN RIVER
Blue R.
Kickapoo R.
Painted Rock
Yellow R.
Prairie du Chien
Ft. Crawford
Atkinson
Turkey R.
Volga R.
Farmersburg
Dodgeville
MINERAL POINT
Belmont
Willow Spring
Centreville
Patrick's Fort
Cassville
Winchester
LA FAYETTE
Osceola
Du Buque
Durango
Platte R.
Fevre R.
GALLENA
Apple R.
Rush C.
SAVANNAH
Plum R.
Pikatonok R.
Dog's Head R.
Bellevue
Buffalo C.
Prairie C.
Lime Stone C.
Cascade Falls
Makoqueta River
N. Fork
Edinburgh
Dartmouth
Mineral C.
Elkford
Walnut C.
Wabesipinikon R.
Deep C.
Lyons
Fulton
New York
Sambornton
Commanche
New Albany
Washington
Elizabeth
Antwerp
Little Rock R.
LYNDEN
ROCK RIVER
Parkhurst
Berlin
Port Byron
IOWA CITY
Sugar C.
Mud C.
Moscow
Davenport
Rock Id.
Rockingham
Stephensonville
Buffalo
Green R.
BLOOMINGTON
I. Maskudine or in the Prairie
Red Cedar River
CANDOVER
Edwards R.
MERCER
Columbus
Fredonia
New Boston
Pope's R.
Black Hawk
Iowa
Long C.
Upper Iowa
Cape Wau
W A
RITORY

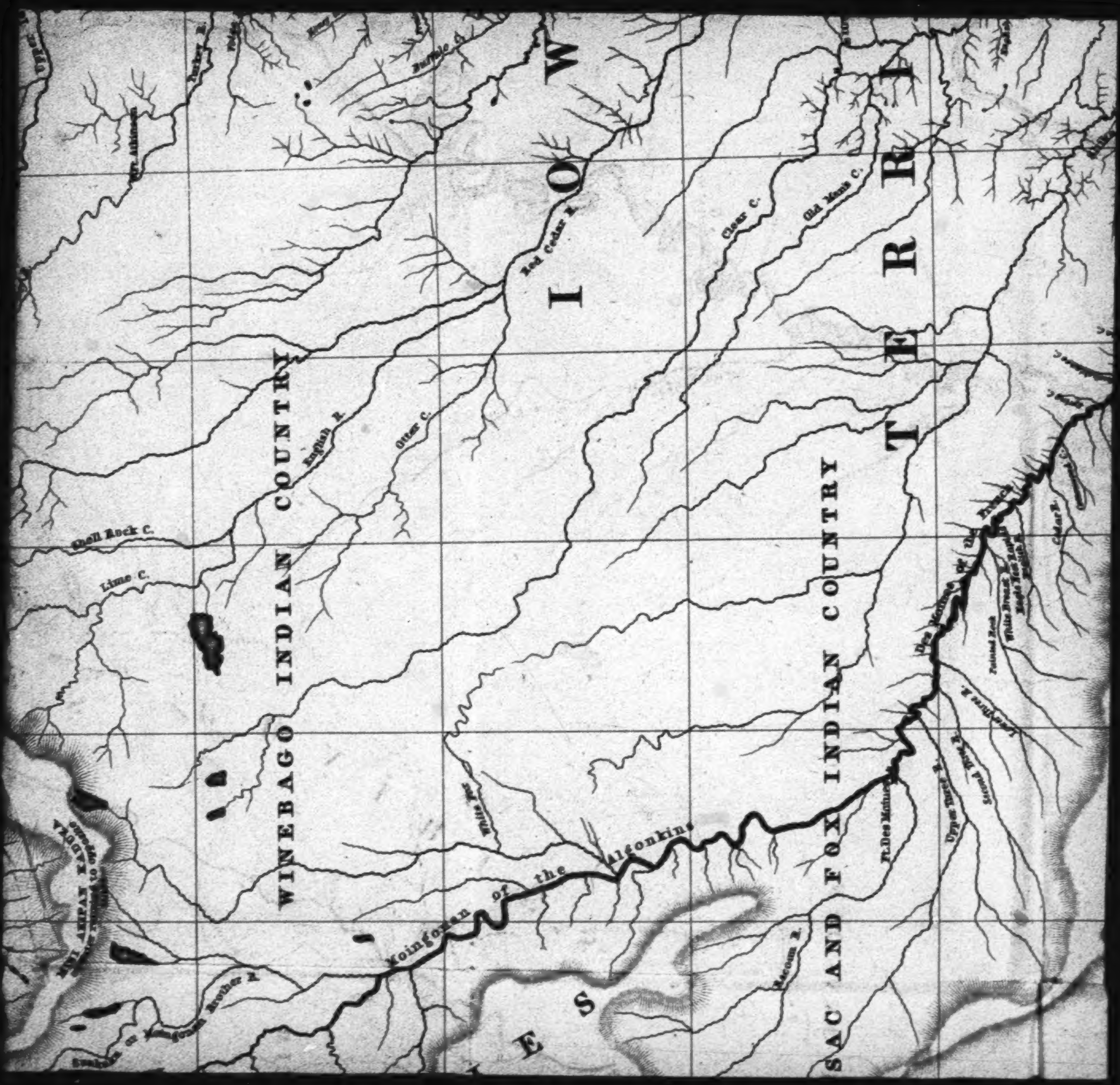

STATE OF ILLINOIS
MISSISSIPPI RIVER
ILLINOIS R.
41°
30'
40°
30'
39°
Black Hawk
New Boston
Pope's R.
Henderson R.
Iowa River
Long C.
MONMOUTH
KNOXVILLE
Benton
BURLINGTON
Augusta
Baltimore
Montreal
Denmark
Madison
Appanoose
Nauvoo
Des Moines or Lower Rapids
Commerce
Montrose
Keokuk
Warsaw
CARTHAGE
MACOMB
LEWISTON
Spoon R.
PEORIA
PEKIN
Crooked R.
RUSHVILLE
QUINCY
Meredosia
SPRINGFIELD
Rochester
JACKSONVILLE
PITTSFIELD
Atlas
Salt Springs
Louisiana
Spencersburg
BOWLING GREEN
NEW LONDON
Salt River
Hannibal
PALMYRA
Monticello
Oakdale
Sharpsburg
Florida
Coal Banks
Clarksville
Paynesville
Ashley
Louisville
Buffalo Knob
Green Hill
New Hope
Auburn
Apple C.
CARROLTON
CARLINVILLE
Grafton
Alton
Edwardsville
TROY
Cuivre R.
Middletown
Columbus
Bentonsport
Farmington
FARMINGTON
Watertown
Sweet Home
ST FRANCISVILLE
Fox R.
Wyaconda R.
Fulton
Gallatin

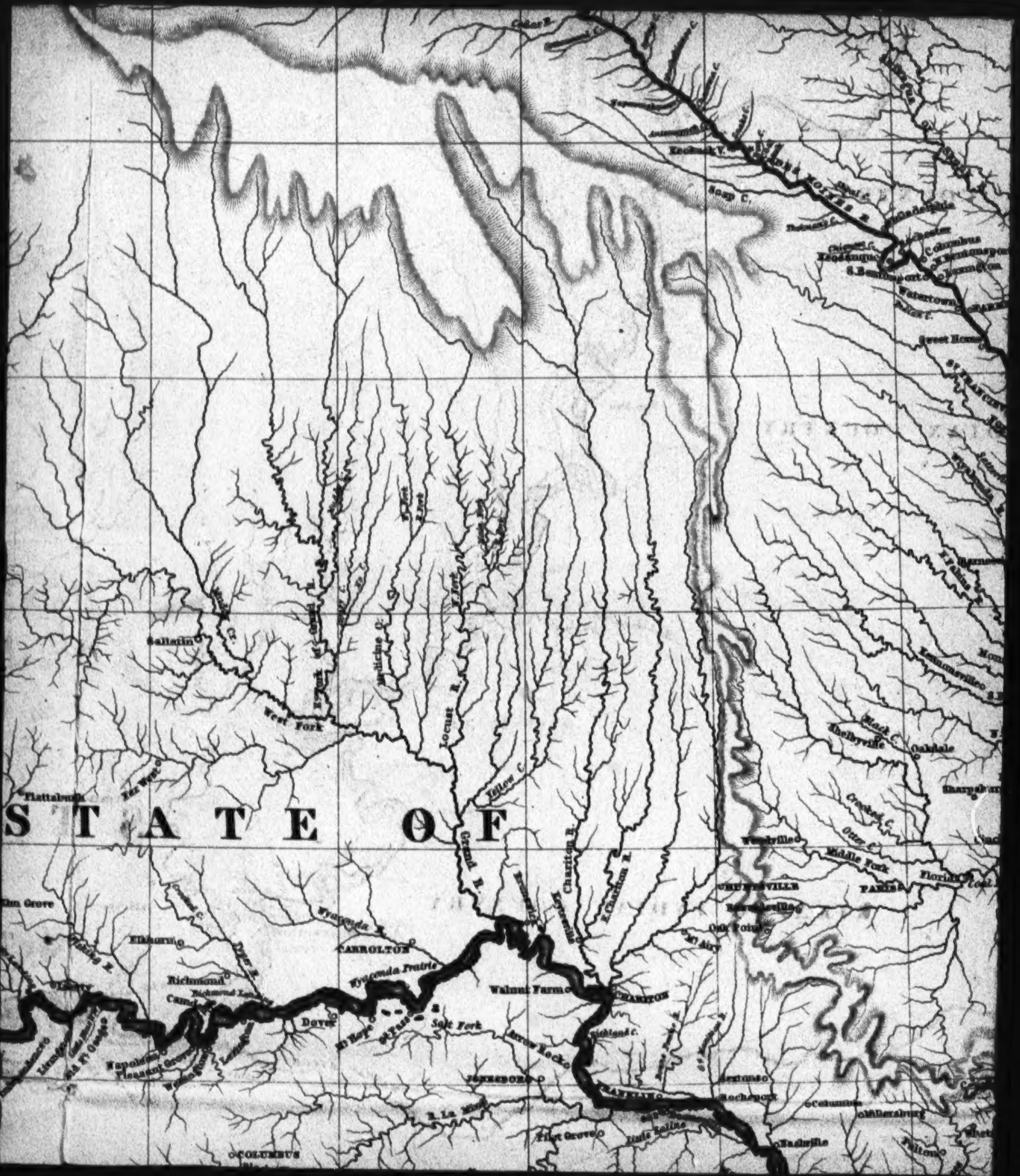
Fulton
Danville
Pendleton
W. Rochester
Hickory Grove
Gallatin
R. Dardenne
Portland
MISSOURI RIVER
Gasconade R.
Pt. Labadie
New Port
Washington
Manchester
Maramec R.
Jefferson Barracks
St. Louis
Bellefontaine
Florissant
Cuivre L.
Edwardsville
Kaskaskia R.
92°
30'
91° Longitude West 30' from Greenwich 90°

94
30'
93
30'
92
30'
Little Fork
Big Fork
Nameken or Sturgeon L.
Sand Pt. L.
Crane L.
Vermilion R.
Vermilion L.
Nameken R.
Lla Croix
Loon L.
Iron L.
Crooked L.
R. Malligne
Perch L.
REGION OF
HUNTERS ISLAND
Knife L.
Carp L.
Birch L.
HEIGHTS
MISSA
Dead Fish L.
Seven Beaver L.

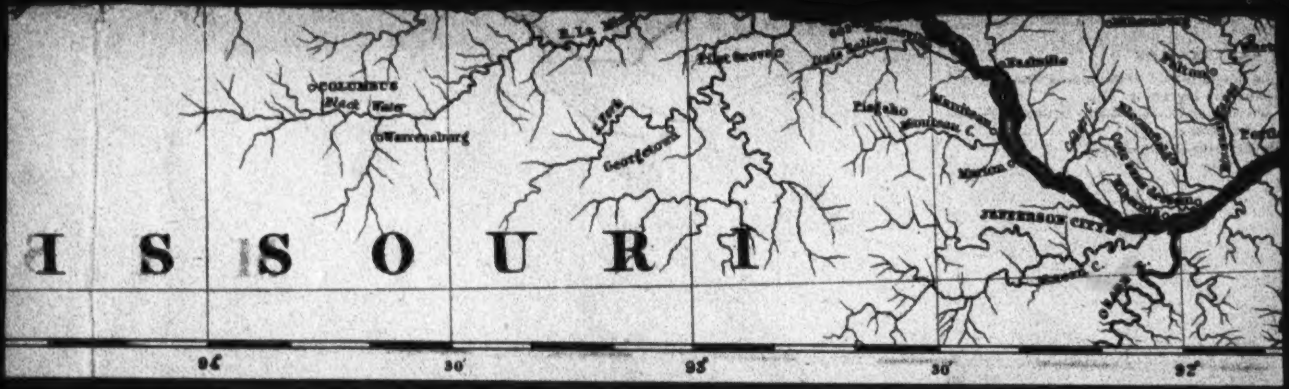

D
S
A
B
A
Sand Hill L.
Seven Beaver L.
St. Louis R.
Cloquet R.
Long Rapid
Pine Rapid C.
Knife Portage
Falls and Rapids
ST LOUIS R.
Pakagomang
Indian V.
L
Upper St. Croix L.
Chippeway Village
Women Portage
Totohitig R.
Namekagon R.
Wantawa or Yellow L.& R.
Stone Portage
Sand C.
Rapids
Pigebimis R.
Pigebimis L.
Ottawa L.
(Court Oreilles L.)
Makwa L.
Kine L.
Red Cedar L.
Ashkabwah L.
Manoominikan L.
W
I
S
C
L. Dodge
Red Cedar L.
Yokey R.
Rapids
Little Rock
Reed C.
Red Cedar C.
Little Rock C.
Buried Eagle L.
Green L.
Falls
St. Francis R.
CROIX RIVER
Island Lake
L. Aitkin
L. Pocket
L. Winni
1266
1284
1250

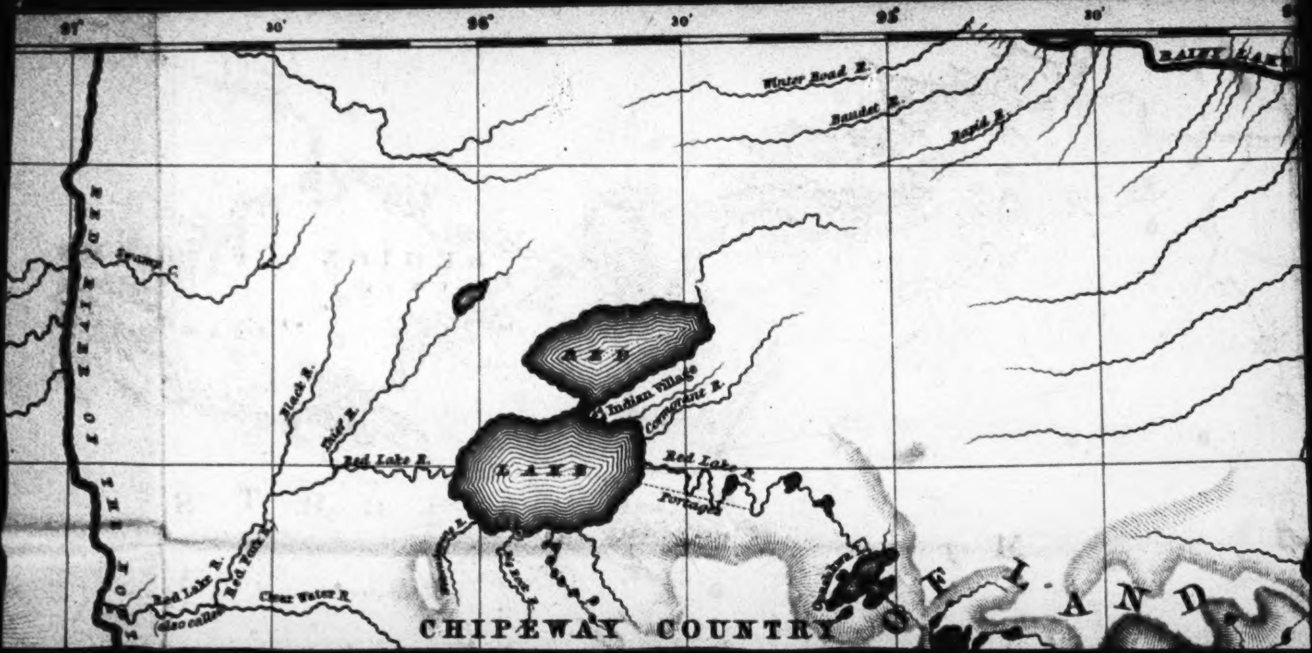

W I S C
T E R
ANTON COUNTRY
WARPEKUTEY
COUNTRY
I O G R E
Mannoumikan L.
Mille Lacs
Cedar R.
Falls
Falls
Rapids
CHIPPEWAY RIVER
Clear Water C.
ST CROIX RIVER
ST CROIX LAKE
Bears L.
Falls of St. Anthony
Carver's Cave
Karishon or Crow R.
1st Rapids
Route to Mankato Island Lake
Castle Hill
Marshy Lands
Inyan Reandata (Natural Obelisk)
Lahontan R.
Cannon R.
Vermillion
Sand Point R.
Buffalo R.
Roque
Wipsi R.
Minnesota R.
Berhakah L.
Wiyaha L.
Wita Shada L.
Tanza L.
L. Fremont
L. Lagen
Ouskiy L.
Oshepah L.
Wahiyan L.
Hokah R. (Root R.)
Upper Iowa
Waukona L.
Nib Wakuntuth L.
Fort Snelling

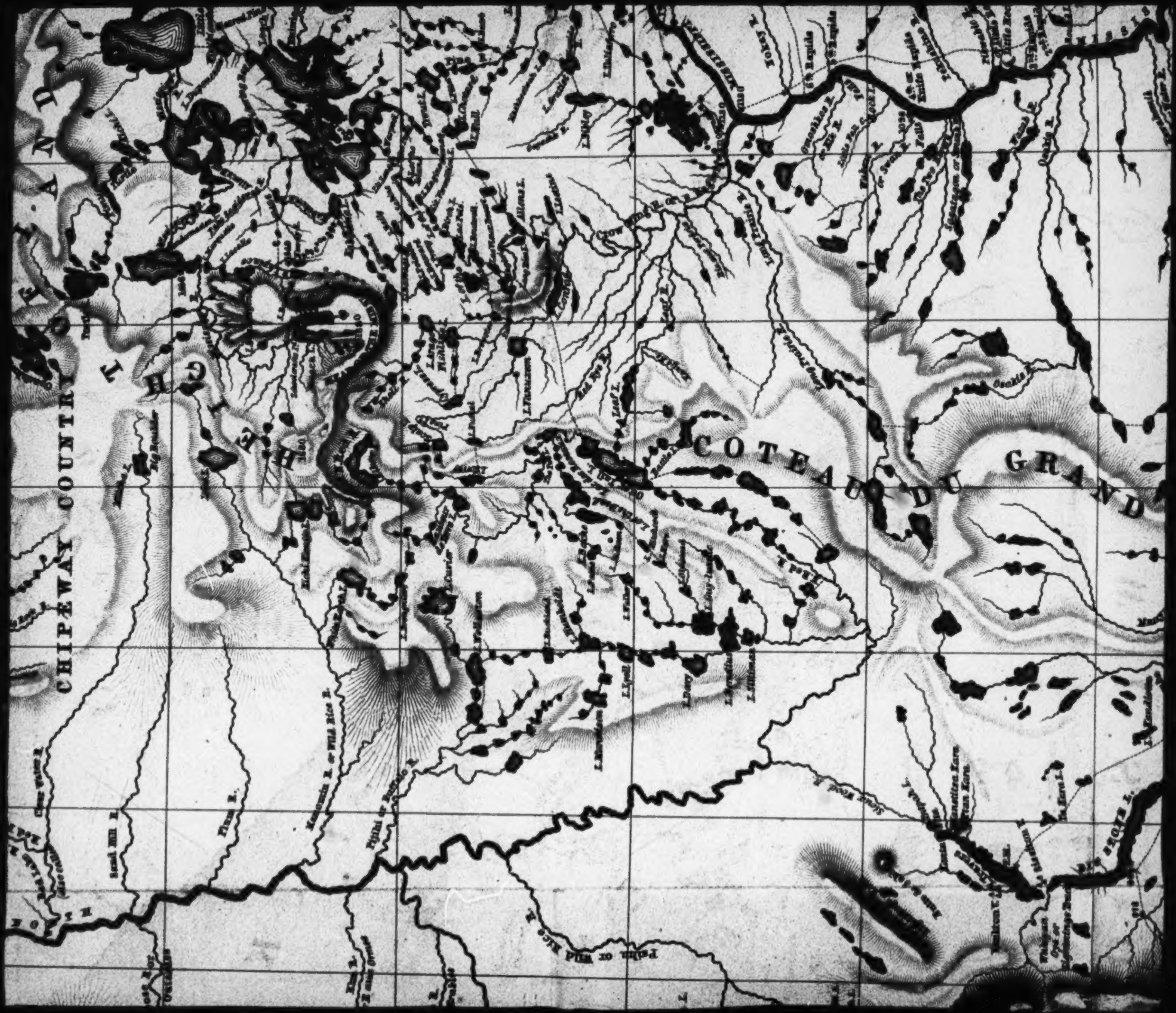

W
O
I
T
R
R
E
T
E
S
WINEBAGO INDIAN COUNTRY
SAC AND FOX INDIAN COUNTRY
Red Cedar R.
Clear C.
Old Mans C.
English R.
Otter C.
Shell Rock C.
Lime C.
Buffalo C.
Turkey R.
Ft. Atkinson
White Fox
Moingonan of the Algonkins
Des Moines of the French
Ft. Des Moines
Raccoon R.
Upper Third R.
Second Third R.
Cedar R.
Painted Rock
Brother R.

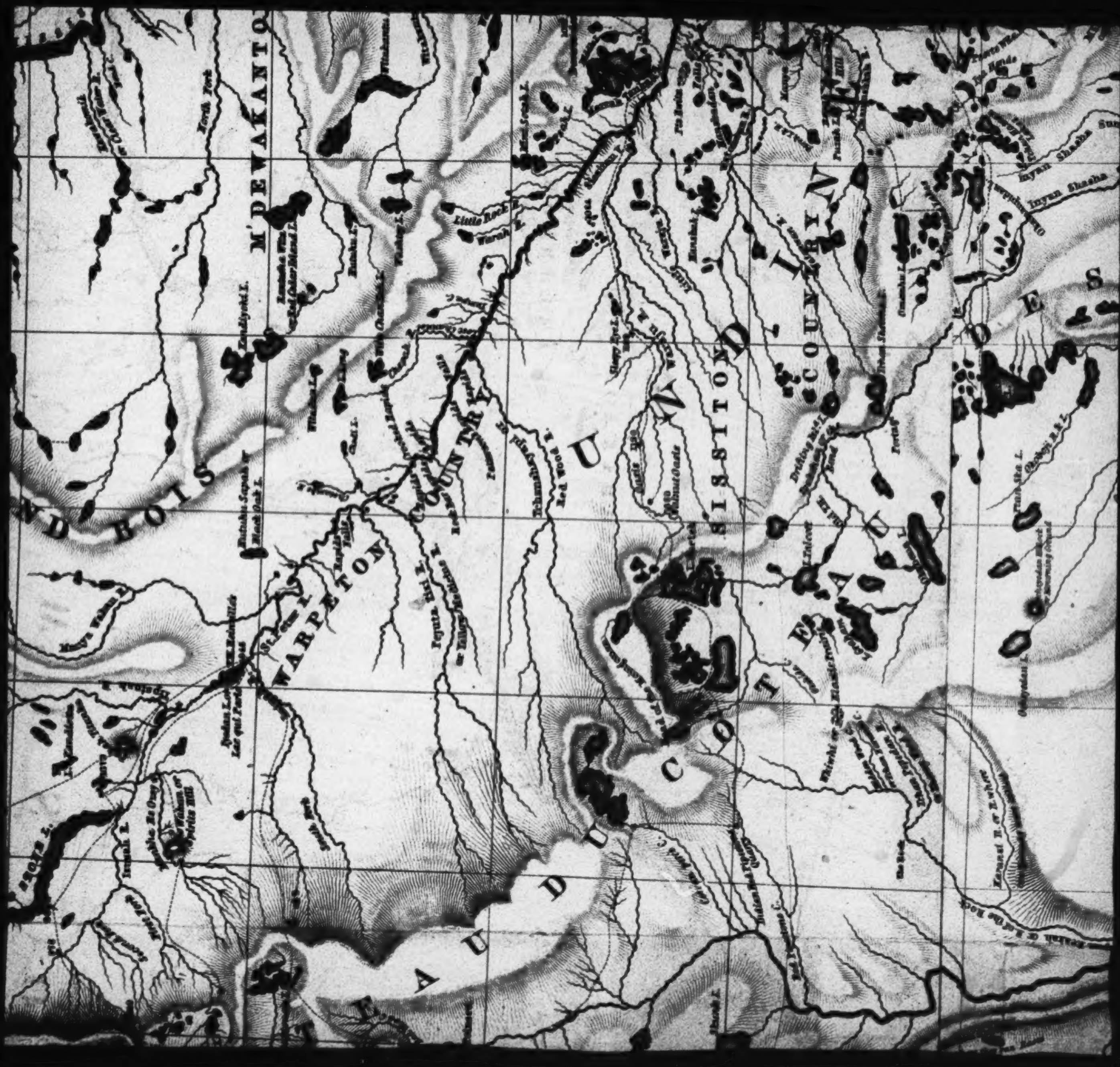


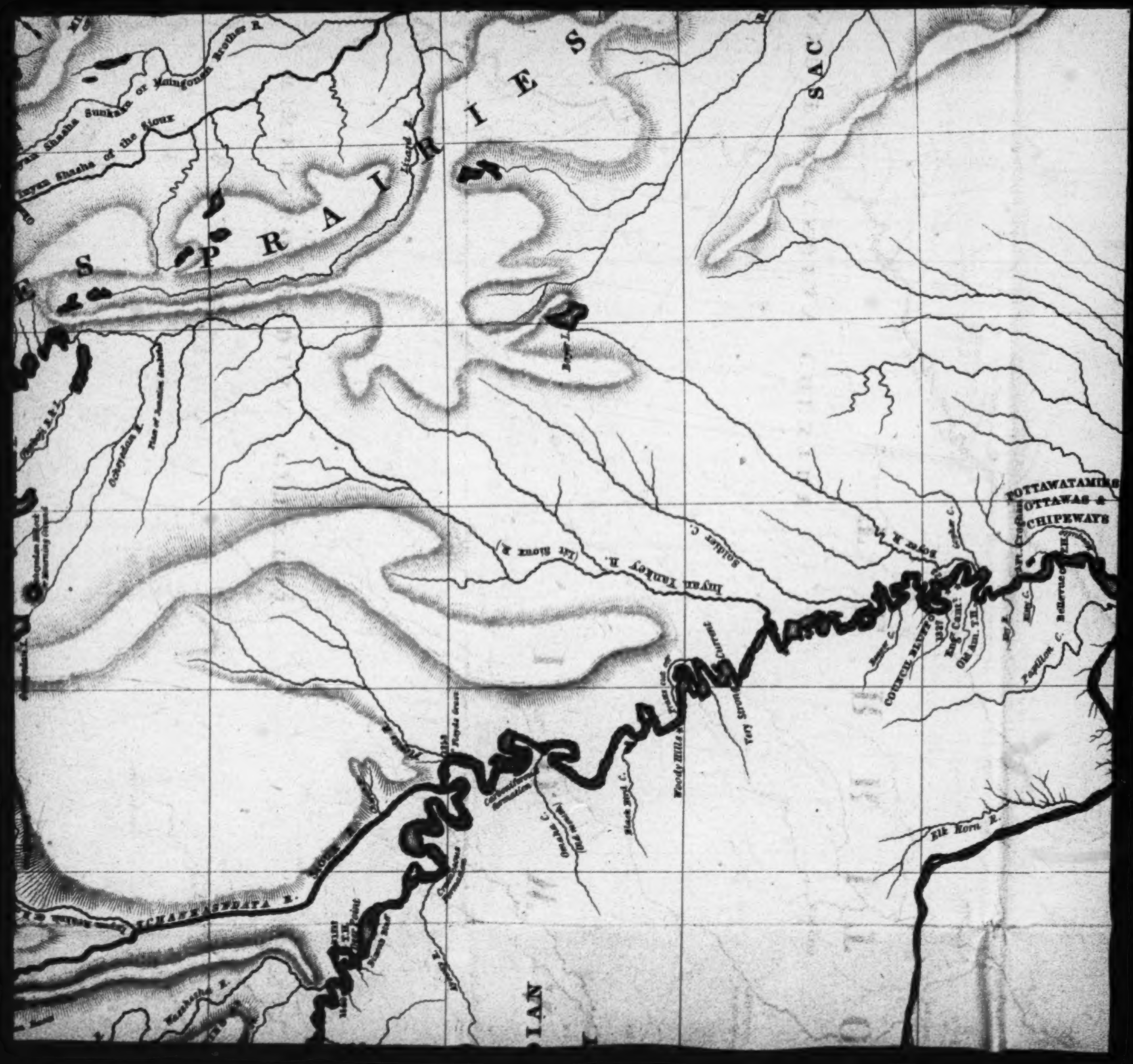
Cedar R.
Keokuk V.
Soap C.
Philadelphia
Columbus
S.Bentonsport
Farmington
Watertown
Sweet Home
ST. FRANCISVILLE
Gallatin
West Fork
Medicine C.
Locust R.
E. Fork
Yellow C.
Grand R.
Chariton R.
E. Chariton R.
Mack C.
Shelbyville
Oakdale
Crooked C.
Otter C.
Middle Fork
Florida
PARIS
Woodville
HUNTSVILLE
Oak Point
Mt. Airy
Plattsburgh
Elm Grove
Elkhorn
Richmond
Richmond Landing
CARROLTON
Wyaconda Prairie
Walnut Farm
CHARITON
Dover
Salt Fork
Arrow Rock
Richland C.
JONESBORO
FRANKLIN
Rocheport
Columbia
Millersburg
Fulton
Pilot Grove
Little Saline
R. La Mine
COLUMBUS
Lexington
Napoleon
Pleasant Grove
Liberty
Lexington
Fishing R.
Crooked C.
STATE OF

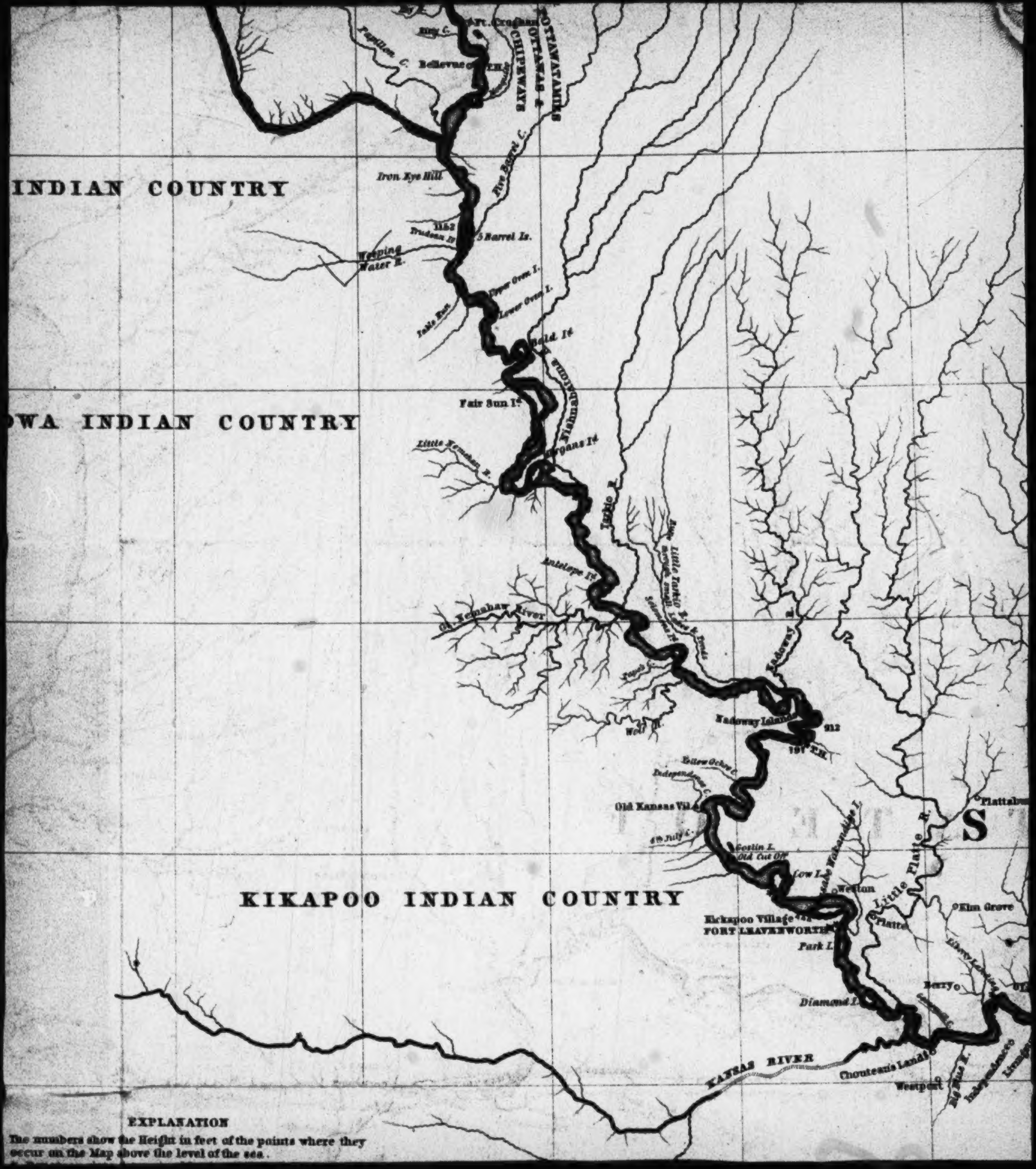

I S S O U R I
COLUMBUS
Black Water
Warrensburg
Georgetown
Pilot Grove
Pisgah
Moniteau C.
Marion
Nashville
JEFFERSON CITY
Fulton
94°
30'
93°
30'
92°



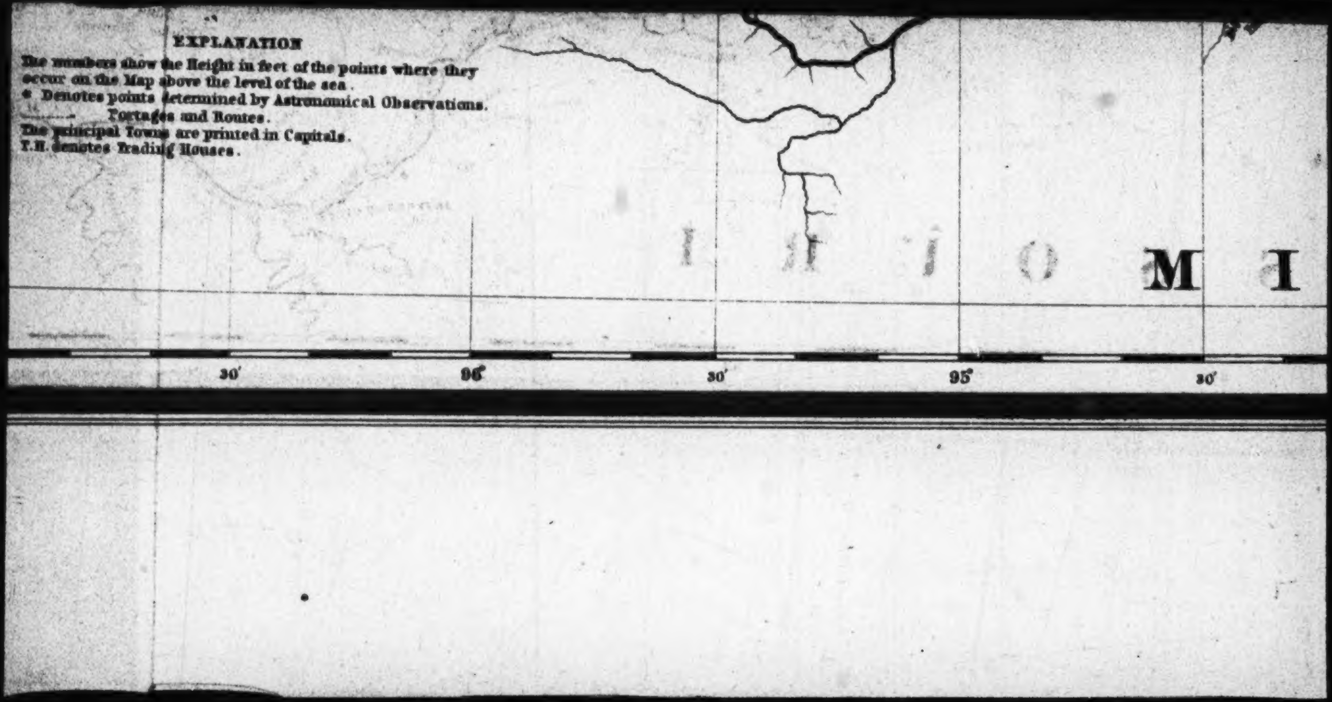

HEIGHT OF LAND
CHIPEWAY COUNTRY
COTEAU DU GRAND
MISSISSIPPI
Crow Wing R.
Long Prairie R.
Sauk Rapids
Elk R.
Leaf R.
Clear Water R.
Red Lake R.
Sand Hill R.
Plum R.
Pifihi or Buffalo R.
Sioux Wood R.
NORTH

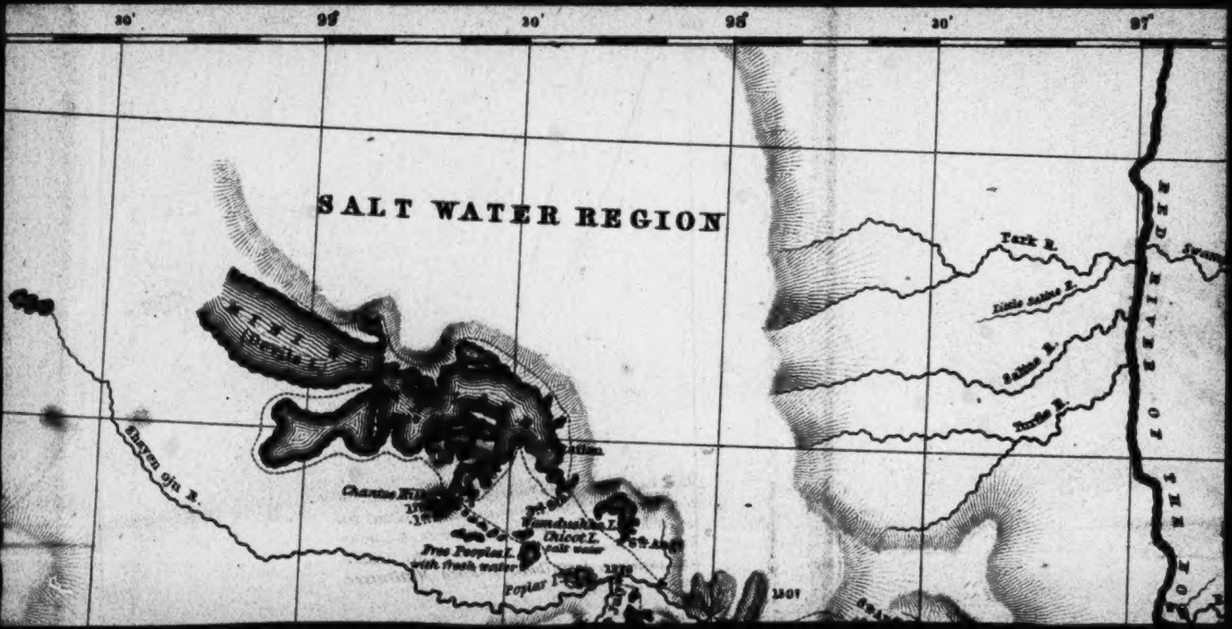

M'DEWAKANTO
ND BOIS
WARPETON
COUNTRY
SISSITON
COUNTRY
DES
COTEAU DES
COTEAU DU
Little Rock R.
Warah R.
North Fork
Inyan Shasha
Inyan Shasha
Red Wood R.
Tchanhasan R.
Mauva Wakan R.
Drifting Soil L.
Olobogi R.R.L.
Stony Lake
Lac qui Parle
St. Peters R.
Tekes L.
Big Stone L.
Lake Traverse
Manhanhatta L.
Hawk's Hill
Owaye Ka R.
Karanzi R. or R. where
Kandiyohi L.
Traverse L.
Lac qui Parle
Intpa Mdeho
Lac Zaida
Talcot
The Rock

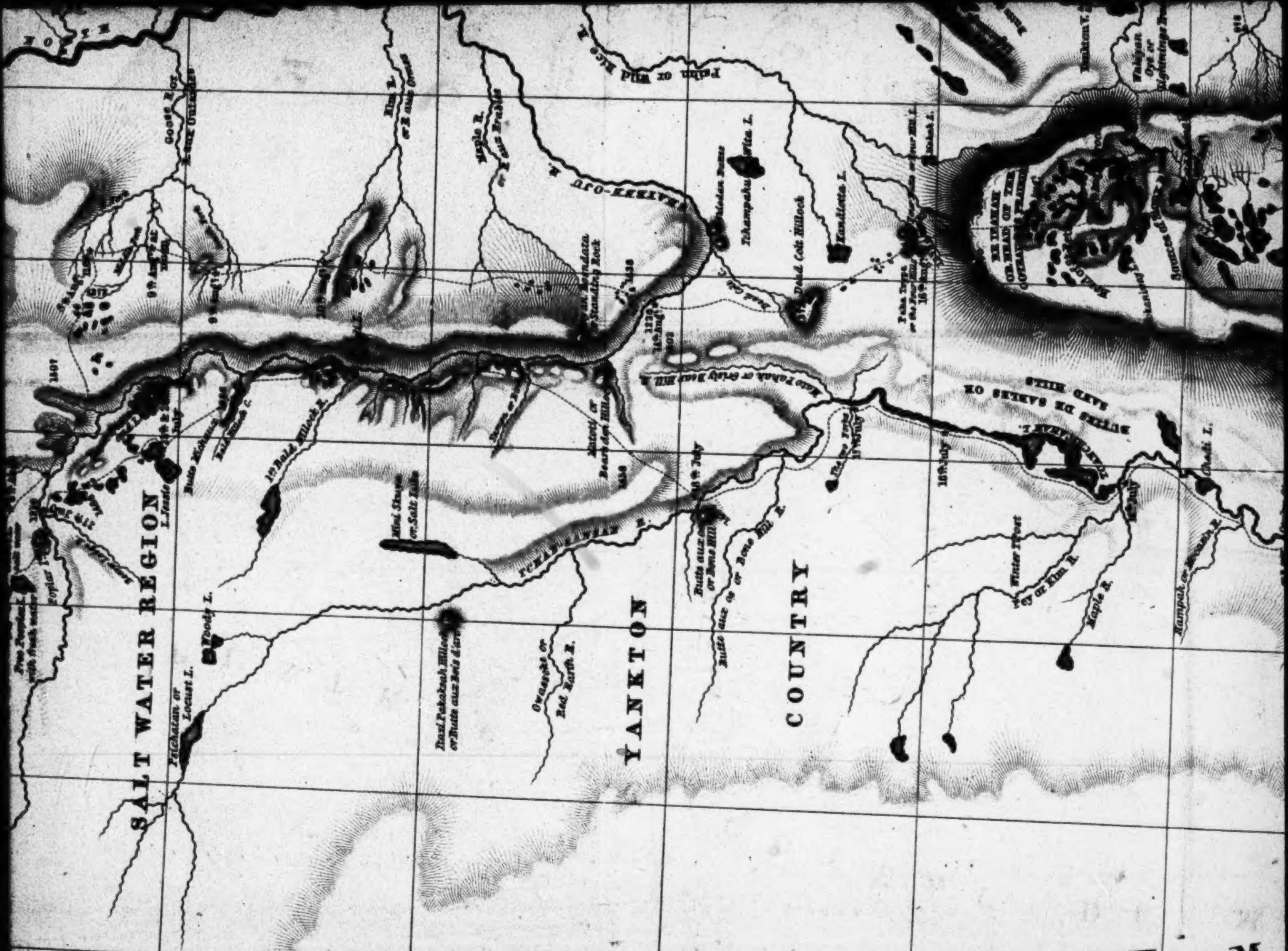

E S P R A I R I E S
SAC
Inyan Shasha Sunkaho or Maingonan Brother R.
Inyan Shasha of the Sioux
Lizard R.
Ocheyedan R.
Bois L.
Inyan Yankey R. (1st Sioux R.)
Soldier C.
Boyer R.
Current
Very Strong
Woody Hills
Black Bird C.
Omaha C.
Carboniferous formation
Floyds Grave
Sioux R.
TCHANKASNDATA R.
Wahsasha R.
IAN
POTTAWATAMIES
OTTAWAS &
CHIPEWAYS
COUNCIL BLUFFS
Engr. Cant.
Old Am. T.H.
Papillon C.
Bellevue
Elk Horn R.

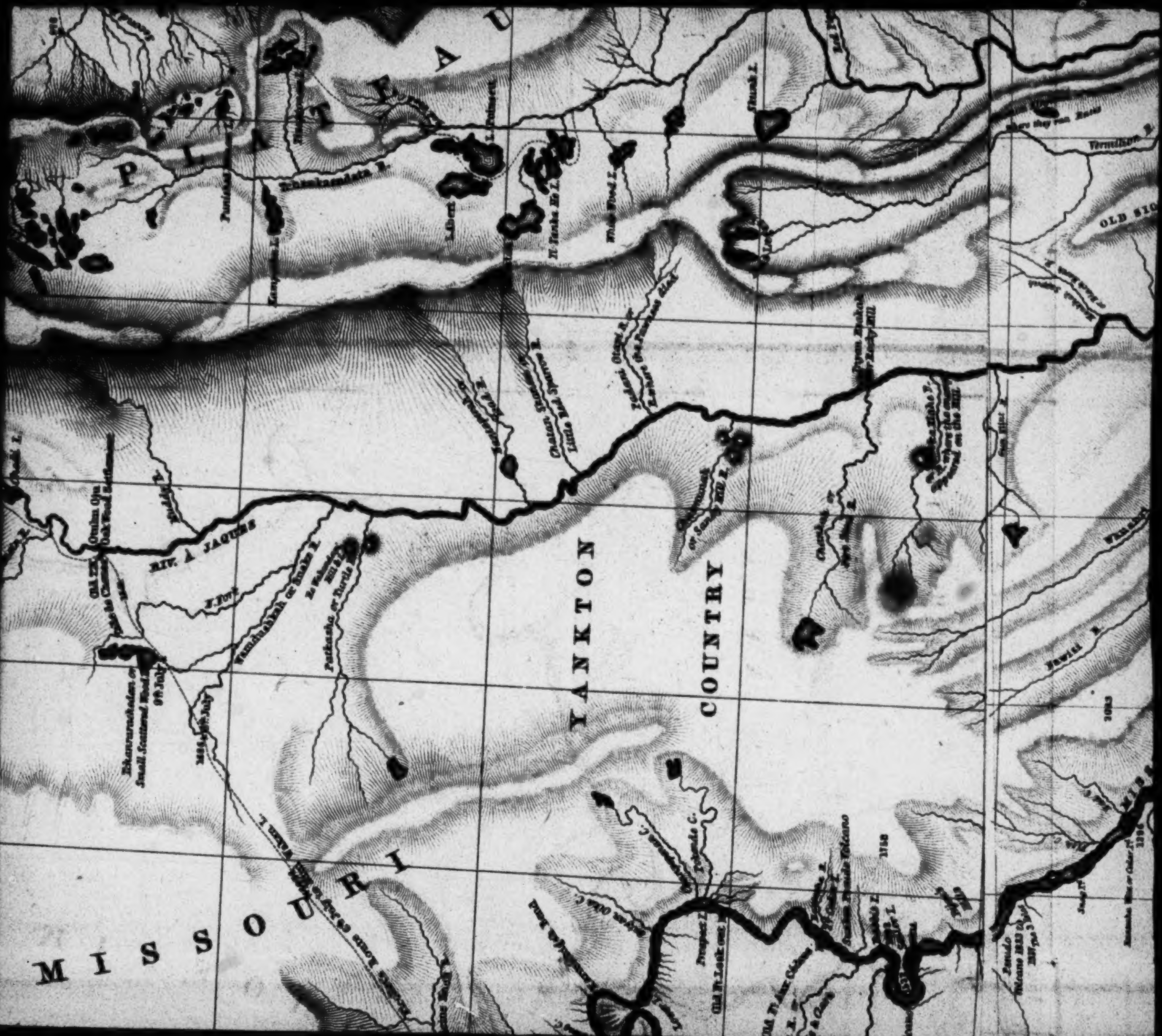


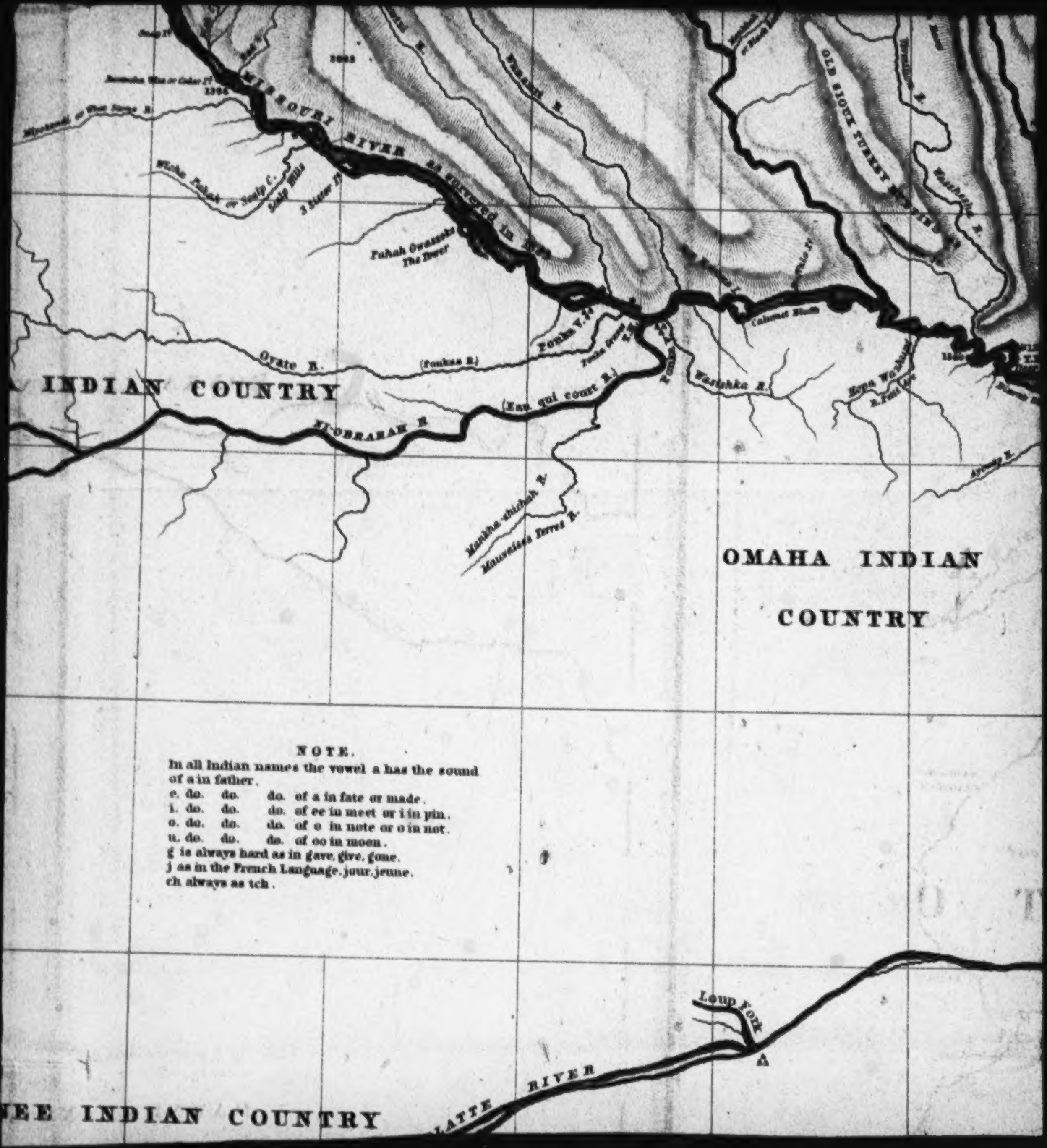
EXPLANATION
The numbers show the Height in feet of the points where they occur on the Map above the level of the sea.


EXPLANATION
The numbers show the Height in feet of the points where they occur on the Map above the level of the sea.
* Denotes points determined by Astronomical Observations.
Portages and Routes.
The principal Towns are printed in Capitals.
T.H. denotes Trading Houses.
M
30'
96°
30'
95°
30'


30'
99°
30'
98°
30'
97°
SALT WATER REGION
RED RIVER OF THE NO
Park R.
Little Sabine R.
Sabine R.
Turtle R.
Sheyen oju R.
Wamduska L.
Chicot L.
salt water
Free People L.
with fresh water
Poplar I.
1301


SALT WATER REGION
YANKTON
COUNTRY
BUTTES DE SABLES OR SAND HILLS
Dead Colt Hillock
Kandiotta L.
Elm R. or R. aux Ormes
Maple R. or R. aux Erables
Goose R. or R. aux Outardes
Psihu or Wild Rice R.
Butte aux Os or Bone Hill
Owanzoe or Red Earth R.
Winter Trout
Maple R.
Locust L.
Woody L.
EAU DU M


P L A T E A U
Tchanksasdata R.
Vermillion R.
OLD SIO
RIV. A JAQUES
Oak Wood Settlement
J. Fork
Wamdushkah or Snake R.
Pattanaha or Turtle R.
Small Scattered Wood
Little Red Sparrow R.
YANKTON
COUNTRY
M I S S O U R I



NOTE.

In all Indian names the vowel a has the sound of a in father.

e. do. do. do. of a in fate or made.

i. do. do. do. of ee in meet or i in pin.

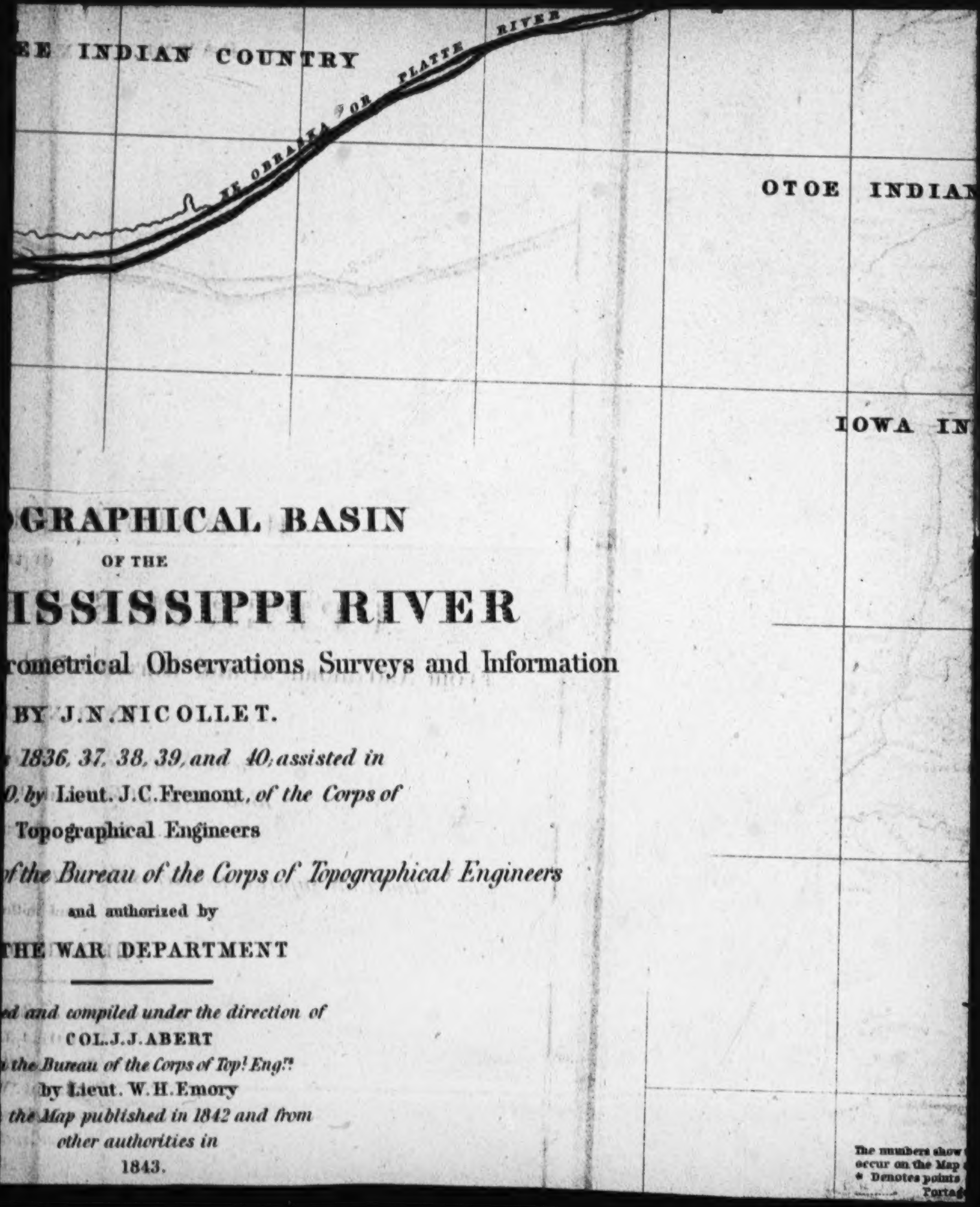
o. do. do. do. of o in note or o in not.

u. do. do. do. of oo in moon.

g is always hard as in gave, give, gone.

j as in the French Language, jour, jeune.

ch always as tch.

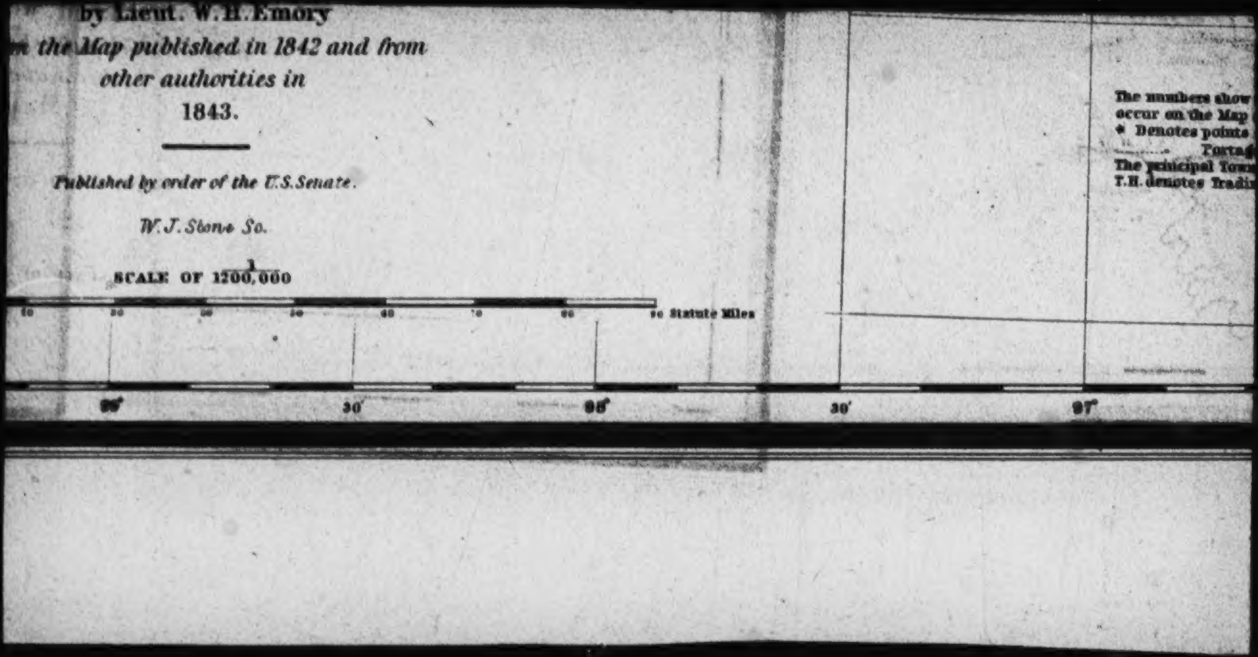


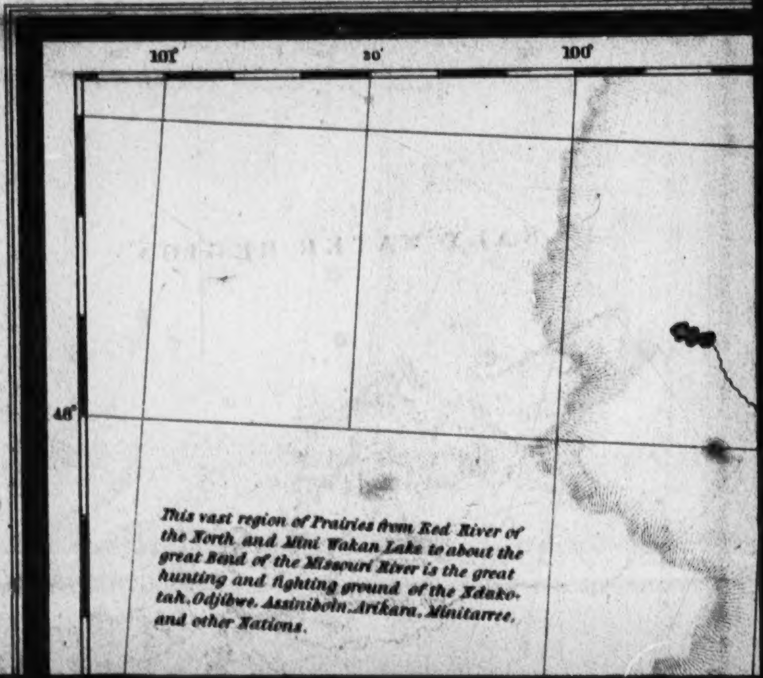
GRAPHICAL BASIN
OF THE
ISSISSIPPI RIVER
rometrical Observations Surveys and Information
BY J. N. NICOLLET.
1836, 37, 38, 39, and 40; assisted in
0, by Lieut. J. C. Fremont, of the Corps of
Topographical Engineers
f the Bureau of the Corps of Topographical Engineers
and authorized by
THE WAR DEPARTMENT

---

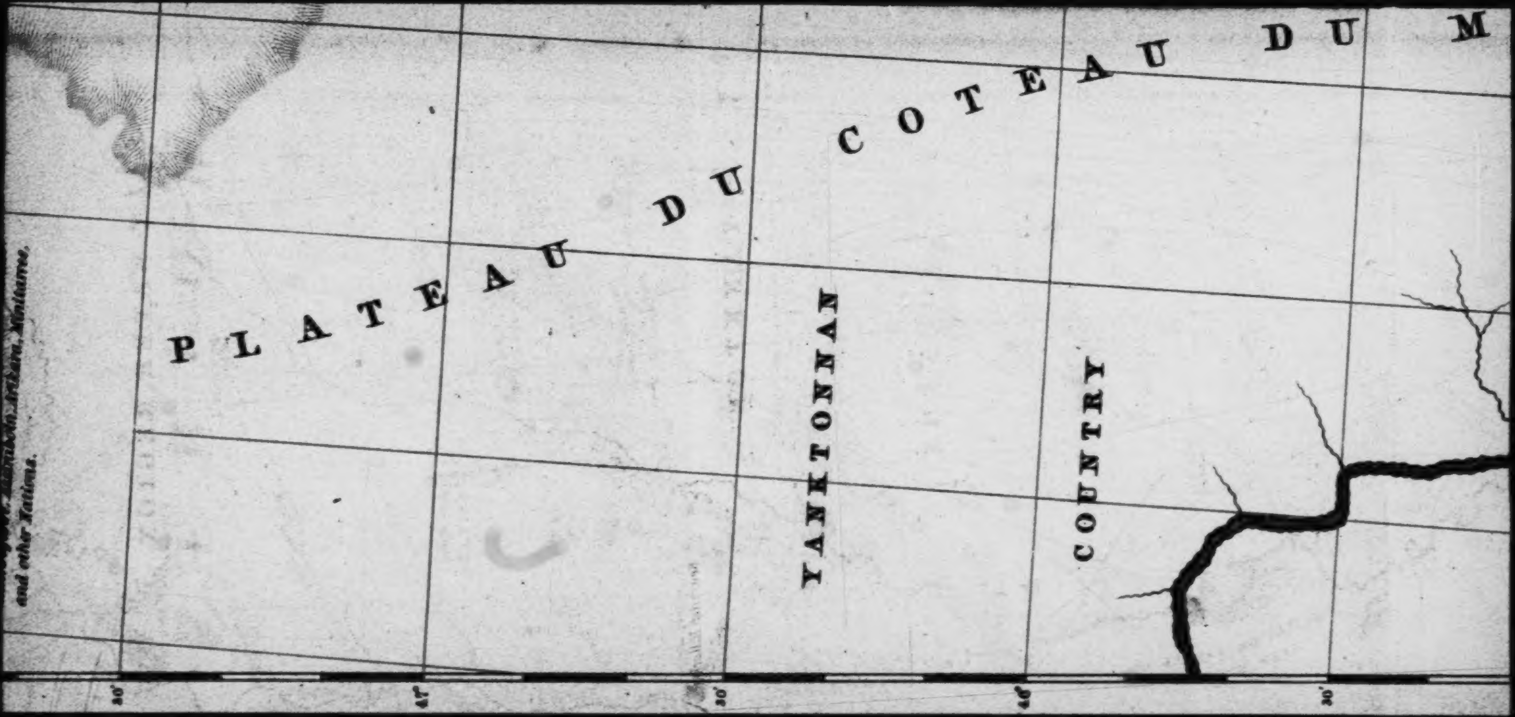
d and compiled under the direction of
COL. J. J. ABERT
the Bureau of the Corps of Topl. Engrs.
by Lieut. W. H. Emory
the Map published in 1842 and from
other authorities in
1843.

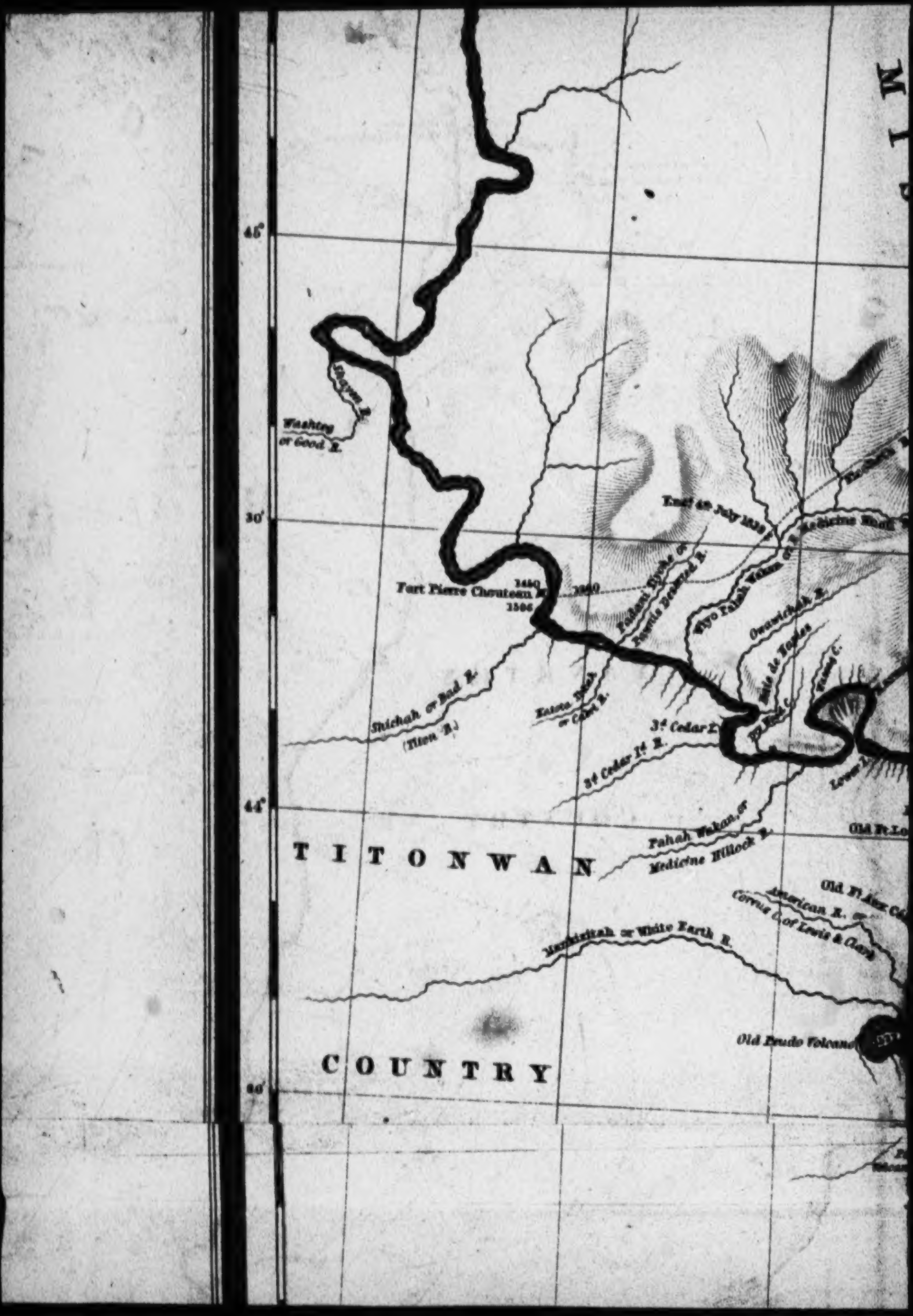
The numbers show
occur on the Map
◆ Denotes points
Portag

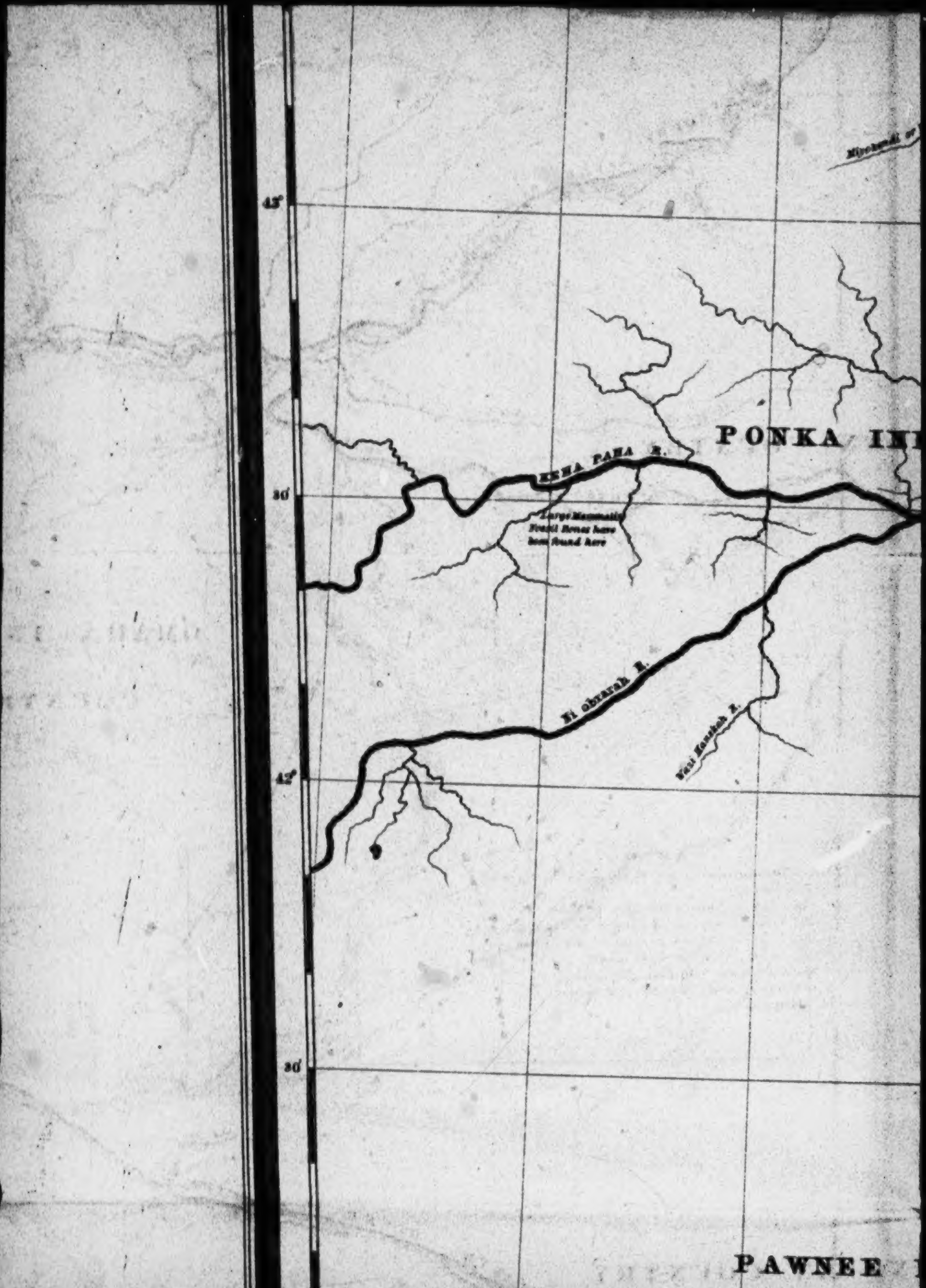




This vast region of Prairies from Red River of the North and Mini Wakan Lake to about the great Bend of the Missouri River is the great hunting and fighting ground of the Ndakotah, Odjibwe, Assiniboin, Arikara, Minitarree, and other Nations.


PLATEAU DU COTEAU DU M
YANKTONNAN
COUNTRY
Arikara, Mandans,
and other Nations.
30'
47°
30'
46°
30'

M I
45°
30°
44°
30°
Washteg or Good R.
Shayen R.
Fort Pierre Chouteau
1440
1500
1506
Encamp. July 1839
Medicine Knoll
Wyo Pahah Wakan or R.
Oosawichah R.
Isle de Vaches
Pahami Tiyoke or Pawnie Descent R.
Kaiasa Tanka or Cabri R.
Shichah or Bad R.
(Titon R.)
3d Cedar I.
3d Cedar Id. R.
Lower
Old Ft Lo
Pahah Wakan, or Medicine Hillock R.
Old Ft Aux Ce
American R. or
Corvus C. of Lewis & Clarke
Marhkizitah or White Earth R.
Old Pseudo Volcano
T I T O N W A N
C O U N T R Y


Mipokendi or
43°
PONKA IN
KEHA PAHA R.
30'
Large Mammalia Fossil Bones have been found here
Ni obrarah R.
Wazi Kanteh R.
42°
30'
PAWNEE

to take in consideration, and apply the conclusions which have been commended by the most eminent observers. For example: Mr. Ra- ond has furnished us with indications in this regard, derived from his g experience in Europe. These indications, which flow naturally m the theory, I have found also to be verified in the plains of Western erica, where the physical circumstances are relatively the same.

1. We are liable to estimate altitudes *too low*, when the observations the barometer have been in the morning or in the evening; when the er barometer being on the plain, the upper is in a narrow deep valley; en the wind blows strongly from the south; finally, when the weather about to be, or is already, stormy;—a case which gives rise to great ors.

. We are liable, on the contrary, to estimate altitudes *too high*, when observation is made between noon and two or three o'clock, p. m., ecially in the summer, and under a hot sun; when the upper barome- being on the summit of a mountain, the lower is in a confined and minated ravine; when there is a strong northerly wind, especially if observation be made on a mountain with such a wind striking on steepest side.

agrees, then, with these valuable notices, that the best period of the for barometric observations of the altitude of mountains, is just at noon; and that observations made early in the morning, or late in evening, are the most subject to errors, which may be referred to the nding or descending currents which, at such hours, are taking place he atmosphere, and to the varying degree of its dryness.

To all such rules, furnished by science and experience, I have con- med, as far as I have been capable. Everything was to do in relation the subject in the West, when I first went there. After all, I have ly laid the foundations of a great and important work, which others l add to and enrich; and I have reason to hope, therefore, that the merous results of this kind, which I present in the Table of Geograph- l Positions, will be received with indulgence.

All these altitudes, with the exception of what is south of the entrance the Ohio, have been referred to the ordinary low water in the Missis- pi at St. Louis. The absolute height of the barometer at this point not known; and my addressing myself to the reverend fathers, the at the head of the University of St. Louis, and engaging them making meteorological observations, was the first approach towards ing it. They acquiesced cheerfully in my proposal, as they with everything tending to the advancement of learning. The late verend Mr. Vansweevelt charged himself with the task, for which I e him a fine cistern barometer of Troughton, and received afterwards een months of observations, made five times a day, and followed as ularly as his official duties would permit, through the years 1835 and .

When Mr. Vansweevelt was obliged to discontinue his observations, I the good fortune to find a successor, not less zealous, in Dr. Engel- n, who was provided with a syphon barometer, graduated in French es, and who followed these observations with a regularity that was ooked for from a person so occupied otherwise with professional en- ments. The years to which these observations refer are 1837, 1838, , and [illegible] 1840.

With these two barometers, as well before as after my excursions in the West, I compared those which were for use in my journeys. Unfortunately, we were not able to compare the two between themselves directly at the epoch when the care of making the observations passed from one hand to another, as I have already mentioned; nor for the subsequent reductions am I able to say which of the two instruments was more reliable than the other, or that either was entirely to be considered as what is called a *standard* barometer; although, in relation to my travelling barometers, they have been both necessarily so regarded, respectively.

The two series observed, as I have indicated, and making use only of the noon readings, have served for me to deduce the elevation of St. Louis above the Gulf of Mexico. It must be remarked, however, that the aggregate of the observations, independent of what has already been said, is not numerous enough to assure the exactness of an element so delicate as *the mean annual height* of the barometer. Experience proves that many years of observations are required for that. The absolute elevation, therefore, which I have assigned to St. Louis in the table, will, probably, hereafter have to be amended. It may be that the absolute height of the barometer, by which it is implied, is uncertain, to at least 0.050 inch, and that the effect of the error is to make the altitude too high.

As for some time the members of the Western Academy have undertaken a regular system of meteorological observations, we have reason to hope that, in some years from this, there will be a definite clearing up of this point. Then the correction, which turns out proper to be applied to the altitude of St. Louis, will be also applicable, in the same sense, to all the altitudes of the table which are north of the mouth of the Ohio. The relative differences of level will remain the same; only the absolute level above tide will be changed.

When the course of my observations carried me to the regions of the North and Northwest, the stationary barometer at St. Louis, to which my portable barometers were referred, became too distant for simultaneous observations to be any longer comparable. I had foreseen this difficulty, and had succeeded in establishing, as soon as needed, two new fixed barometer stations, much higher north—the one at St. Peter's on the Mississippi; the other at Camp Kearney, near Council Bluffs, on the Missouri. At each of these points there was a stationary barometer, corresponding four or five times in the day with the barometer at St. Louis, and affording, at the same time, for my portable barometers, a reference to one or the other, according as my position at any time brought one or the other the nearest.

Nevertheless, as both of these stations are at a great distance from St. Louis, whether the length of the journey necessary for communicating between them, or their geographical positions and direct distance apart, be considered, it became necessary that their differences of level, as respects St. Louis, should be determined by the greatest number of observations possible. In this view, I deem it fit to introduce here the results of these determinations.

1. The station at *Camp Kearney* was occupied by the venerable missionaries, the Rev. Messrs. De Smedt and Werreydt. I furnished them with a barometer, well compared with that of Dr. Engelmann at St. Louis, and with my own, and delivered it at their missionary station in

good condition. Mr. De Smedt, with whom I had passed some days of travel on the Missouri, soon made himself acquainted with the manner of taking observations; and proved it, in furnishing me with a four-months' series, made with a care that the most scrupulous examination could only confirm, and embracing the period between the 17th of May and 17th of September, 1839—an interval during which I was exploring the Northwest.

The barometer at St. Louis was situated in a small exposed plain; that at Camp Kearney was placed in the valley of the Missouri, which is deep, and often three to five miles wide. Using only the noon observations for both, grouping them by 20, and applying the reduction of the stations to their respective levels, the calculations give the following results:

Station at Camp Kearney, above St. Louis, by—

20	observations	at noon,	in May and June, 1839	598 feet.
20	do.	do.	in June, 1839	680 "
20	do.	do.	in June and July, 1839	633 "
20	do.	do.	in July and August, 1839	659 "
20	do.	do.	in August, 1839	694 "
13	do.	do.	in September, 1839	667 "
113	do.	do.	mean difference of level	655 "
	Reduction for St. Louis to the Gulf			382 "
	Altitude of the Missouri at low water, near Council Bluffs, above Gulf of Mexico			1,037 feet.

These detailed results appear to me satisfactory enough, regard being had to the horizontal distance between the two stations.

2. Having made, in 1836 and 1837, a long stay at St. Peter's, under the hospitable roof of my particular friend Major Taliaferro, (then and now the Indian agent,) and having again visited the place in 1838 and 1839, I have had the occasion of determining its altitude with barometers of dissimilar construction, and by observations made in the course of three different years.

The barometer was placed in my chamber, at the Indian agency near Fort Snelling, on the beautiful plateau of St. Peter's, which presents a perfectly open plain.

The following are the results of the calculation, reduced to the level of the Mississippi, for both stations respectively:

Station at St. Peter's, above St. Louis:

1836, July.—By 20 observations at noon, referred to the barometer at the University of St. Louis, (these observations were made before my departure for the sources of the Missisippi)	342 feet.
October.—By 20 observations at noon, referred to the barometer of the University of St. Louis, (these observations were made on my return from the sources of the Mississippi)	381 "
1838, May and June.—By 20 observations at noon, referred to Dr. Engelmann's barometer at St. Louis	365 "
1839, September.—By 20 observations at noon, referred, intermediately through another barometer, to Dr. Engelmann's	359 "

By 80 observations at noon, mean difference of level -	362 feet.
Reduction for St. Louis to the Gulf - - -	382 "
Altitude of the Mississippi, at low water, near St. Peter's, above the Gulf of Mexico - - - - -	744 feet.

The accordance of these detailed results appears to me satisfactory, when account is taken of the different circumstances under which these elements have been obtained. The observations of the month of October present the greatest discrepancy. The autumnal season was then too far advanced; during which the oscillations of the barometer begin to be rapid. It is, therefore, very rarely that I have made use of barometric observations taken at this period of the year, except when the state of the atmosphere (as is sometimes the case in the West during the fall) was extremely favorable.

But, leaving this point, I consider that these two principal stations present results in altitude sufficiently exact to answer the calls of geography, of geology, or of general topography.

These stations of the second order, in reference to St. Louis, have thus served as a base for a great number of stations of the third order. All the heights observed in the upper regions, to the south and west of St. Peter's, have been referred to the barometer of this station; and all the heights taken in the region of the northwest, in the great valley of the Missouri, and on the western slope of the Coteau des Prairies, have been referred to the station near Council Bluffs.

In regard to the stations of the third order, I must remark, that there are many whose altitudes are determined, not by a transient reading of the barometer, but by sets of observations taken during my stay at such stations, both for this purpose and for the astronomical part of my work, or for the reconnoissance of the adjacent country. Such are the stations at the Traverse des Sioux, Lac-qui-parle, Lake Shetek, Spirit lake, the sources of La Hontan river, Okamanpidan lake, the head of the Coteau des Prairies, Lake Mini-wakan, at Otuhu, or Talle de Chênes, on the Tchan-san-san river, Fort Pierre Chouteau, Huppan-Kutey prairie, Cedar island, Five Barrel island, on the Missouri, and some others. And in 1836, during my campaign to the sources of the Mississippi, I stopped, with the same object, at Crow-wing river, at Guyashk lake, at Kadikomeg lake, Sandy lake, Leech lake, Itasca lake, and elsewhere.

Further, as to the relative level of the ground, and its irregularities, which we passed over in our daily marches, the method pursued has been this: We observed the meteorological instruments in the morning before breaking up the camp; we also observed them in the evening when arrived at a new spot, where we were to pass the night; thus informing ourselves of the barometric range during the night, and obtaining some premonitions of the state of the atmosphere to be expected on the morrow. During the day, wherever the soil presented to us characteristic undulations, ridges, hills, hillocks or *buttes*, or deep glens enclosing some stream, we halted to observe for their relative differences of level; *i. e.*, we measured the highest points in reference to the general surface of the plain at their base; and the surface of *plateaux* bordering rivers, in reference to the bed of the stream; then, to reduce these levels, so obtained, to that of the sea, I could refer them to those which had been measured at points of the third order, where we had made a more or less protracted stay; and, finally, to confirm the levelling of these transient stations, which may be termed of the fourth order, we had the control from two extreme and limiting stations of the third order, together with the lights derived from our continuous sketches of the route, and the descriptive journal of what we saw.

I ask pardon for entering into details, tedious and useless even for those who are familiar with the subject of which I have been treating. But I believed that I ought not to dispense with a candid exposition of the methods of observation which, in this particular, were left for me to follow.

II. The best method of determining *time*, in exploring expeditions, when one is not provided with a transit instrument, is to measure the absolute altitudes of the sun, or of some principal stars, taken both east and west of the meridian of the spot where the observation is to be made.

The method of *equal altitudes*, which appears still generally adhered to, exposes such an expedition to loss of time, without offering any decided advantages over the observation of absolute altitudes. In order to effect the utmost possible, the whole day-time has to be occupied in gaining ground and distance, in reconnoitring and sketching the features of the country; while a portion of the night must be devoted to astronomical observations, however strong might be otherwise the desire for repose. The health of the observer, too, requires that he should not expose himself, without absolute necessity, to make a long stand under the direct heat of the sun; and, more than all, the method of equal altitudes, while it causes a halt for several hours, exposes, also, to the regret of seeing the sun passing the meridian without avail; for it must be remembered that the season for such expeditions (the finest part of the year) is also the season during which the sun, with his high northern declination, cannot be reached at noon with the divisions of the sextant.

But, with the method of *absolute altitudes*, two or three series of observations to the east, and two or three series to the west of the meridian, taken in the course of the same night, upon some of the principal stars, (which must be selected, as much as possible, to fulfil the theoretical conditions required for good hour-angles,) are enough to supply the absence of a transit instrument, which is not always within the means of a private traveller to be procured, or to be carried.

The calculations which have to be made out in both cases, (absolute altitudes and meridian transits,) do not differ in amount enough to offer advantage in the employment of either one above the other; for if, on the one hand, there are no hour-angles to deduce from absolute altitudes, there is not less the necessity of observing stars differing much in declination, in order to determine the deviation of the instrument from the plane of the meridian.

Now, to make a judicious application of the method of *absolute altitudes*, it must be remembered that the formulæ for the calculation of the hour-angle are derived with the assumption that the changes of altitude in the heavenly bodies, above the horizon, are proportional to the times; but this can be taken as strictly true only for short intervals of time—say four or five minutes. To prolong, therefore, a series of observations beyond a term like this, is to introduce a case wherein must be used another formula for the correction to be applied to the hour-angle, determined as before, in order to restore it to the exactitude of which the general formula is susceptible. The rule for practice, then, is to observe the greatest number of altitudes possible in a brief interval; which ought not to exceed, at most, four or five minutes of time.

Finally, in order to render all the circumstances, as nearly as may be, equal in the comparisons which have then to be instituted to assure us of the *daily rate* of the chronometers, and the absolute time of the place, it should be made a point to observe the same stars to the east and to the west, as long as their presence above the horizon continues to offer favorable positions for good hour-angles; and as the period approaches for giving up some of them, before dispensing with these to introduce others, it is well to take in the latter, in common, for a night or two, and connect, in this way, the comparisons of stars that are going out, with those of stars that are coming in.

Such are the principles and motives which have directed me in the constant employment of the method of absolute altitudes for determining the time of a place.

III. The latitude of any place cannot be regarded as exactly determined but by deduction from several series of observations, made to the north and to the south of the zenith of the place. The object of this precept is here the same with that which, in determining time, obliges the observation of stars to the east and to the west of the meridian: this object is to compensate the constant errors of the instrument, or those which may arise from a defective adjustment.

Two good series taken in one night—one to the north, the other to the south of the zenith, and each of from 10 to 15 readings—can furnish, by their mean result, a latitude sufficiently precise for the wants of geography. Much more would be required if the station in question is destined to serve as a term of comparison in a great geodetic operation, or to become some day the locality of an important town. An observer, in this regard, may anticipate after times, and estimate what he is allowed to do in supererogation, as it were, without injury to the more special and temporary interests of his mission.

In our hemisphere, the sky south of the zenith is always sufficiently full of principal stars to furnish, in the course of one night, circum-meridian series; and to the north, the constellations about the pole offer to the observer everything he needs. The North star, above all, by its proximity to the pole, is capable of being observed at any point on its parallel, and of being used to deduce the latitude of a place with as much precision as if it had been taken at one or the other of its meridian passages. In the short but fine season which may be annually devoted to the reconnoissance of those temperate regions, (such as I have had occasion to explore,) there is rarely a night in which a propitious sky does not offer intervals favorable for some observations, giving at least an approximate latitude, should it be unsuitable to make a longer halt.

By giving orders to the sentries of the camp, according to what he desires to execute during the night, an active observer can always reconcile some hour of sleep with his duty, whatever little importance may attach to the station, even if it be of the order of those that may be neglected without losing much. Now that any method puts us in the way of making such a station of use, I think that no observer can neglect it without regret. For, in territories little known, and which civilized man is visiting for the first time, a latitude deduced from even a single series for a point, whence but a few years ago you would on the morrow have continued your route without having been able to do anything by the methods then known and employed, acquires a value; and if, in this chance of some favorable instants, your chronometer allows you to reckon a difference of longitude, you have added a geographical position, which, however imperfect it may be, according to circumstances, is yet always better than nothing. Thus, since, by employing the method of which I have been speaking, an observer wants only one hour to determine his geographical position, we may easily conceive the importance of the service he can render to geography by a little activity and a judicious distribution of his time. In geographical explorations *we can neglect nothing*, or we are pursued and punished by bitter regrets, which arise directly we have left the station behind, to tell us that we have failed to draw from the means in our power all that was offered to us. These regrets revive with even more intensity at the period of constructing the maps.

I have made considerable use in this method of the North star; and when I recall the time and expense it has saved, I feel a lively gratitude, both to that astronomer who first knew to make it simple and exact, and thus recommended it to the practice of geographers, and to those scientific men who have made its application still more easy and short, by introducing it annually in the form of tables, in the "Ephemerides of the Heavens." Have I not reason to entertain such a sentiment in reflecting that, of 500 or 600 geographical positions, more or less completed, which I have had occasion to observe during seven years of journeying under American skies, there are not fifteen, the determination of which has not been efficaciously contributed to by the North star?

The methods which science places at the disposal of the geographer, in relation to the problem of the latitude, are truly remarkable, and form a system as complete as could be devised. There remains not an instant of the night or day in which this problem cannot be now practically solved, provided only some region of the heavens be presented disencumbered of clouds.

For my part, I have not disdained to make use even of the method practised at sea for finding *the latitude by two altitudes of the sun*. This method gives a good result when one is able to combine the times of the observations, so as to satisfy the conditions required by the theory; but, even under less favorable circumstances, a sufficient accuracy can still be obtained for geographical purposes. I have employed it in those cases where, coming unexpectedly upon geographical points of some interest, I could fit the halt for the observation with that required; for instance—for the morning's meal, or to allow a rest to the men and horses of the expedition during the heat of the afternoon. I have also applied it whenever, having held up early in the day at a place which I intended to make an astronomical station at night, the indications of the barometer caused me to fear the occurrence of a sky unfavorable to my object; while I wished to avoid, nevertheless, the loss of a station to which I could not spare more than that one night. The observations of this sort are numerous in my journal; but the number to which I have been obliged to have recourse is very limited, owing to the good fortune of having been enabled to make night observations. Yet, as these few have been useful to me in the construction of the map, they furnish me with grounds of congratulation upon my extra caution. They will be recognised, in the accompanying Table of Geographical Positions, as latitudes expressed only in round minutes, without seconds.

IV. The geographer, if he be provided with a telescope, may determine longitudes by observations of the eclipses of the satellites of Jupiter, of (what is much more important) eclipses of the sun, of occultations of the planets and the fixed stars by the moon; and, finally, of the transits of the inferior planets over the sun's disc. The "Ephemerides" apprize him beforehand of the periods and of the principal places where these phenomena will be visible, and furnish, also, the elements of calculation necessary as well to prepare for the observations themselves, as to deduce from them the longitude of the station where they shall have been made. But these phenomena are of rare occurrence; and when they do present themselves, the condition of the atmosphere does not always favor the observation. Means, therefore, more prompt, and even more precise, were a great *desideratum* in science—and science has supplied them.

Such means are found in the transit instrument. By observing with that instrument the right ascension of the moon's bright limb, and the right ascension of some star near the moon's parallel, and not differing much from her in meridian transit, it will enable the observer to determine the difference between the meridian of his place and the primary meridian of the "Ephemerides" in his hands, or any other meridian where he may suppose that similar and corresponding observations have been made.

But both of these methods are yet of very rare resort for geography, inasmuch as the first cost of the instruments, the difficulty and expense of transportation, and even the time they require for setting up and adjustment, are far from being always at the disposal of the exploring traveller. He finds himself reduced, then, like the navigator, to the method of lunar distances, both for obtaining absolute longitudes, and for controlling the differences of successive meridians indicated to him by the chronometer.

This method of lunar distances is laborious in the observation, as well as in the calculation; but it is *certain* in its results when applied with discernment. It demands a great number of individual observations, in order to attenuate the errors which may arise from defective adjustment of the instrument, or from the habit of the observer in making the contact—some being liable to have such contact too strong; others too weak. A small error in the measured distance has a great effect upon the longitude calculated; and the mode to divide these errors consists in observing several series of distances to stars, some of which are to the east, and others to the west of the moon. These series must be combined as much as possible, by *couples* or *pairs;*—that is to say, after having taken the first series on one side of the moon, the second should be then immediately taken on the opposite side. It is in this manner, at least, that I have the habit to do; and it seems to me, from my experience, that more confidence is to be placed in a longitude that is the mean result of two series only, managed in the manner I have indicated, than if it were the mean result of a greater number of series taken throughout on the same side of the moon. When the distances to be measured are between the moon and the sun, we lose, of course, this advantage of observing, in the same day, such *coupled series* as I have been insisting on. But here experience shows that an observer has greater opportunity in the daytime for good adjustment, and better observing, than at night. If, then, he avails himself of this, by extreme care he can still obtain results of satisfactory exactness for geography. Further, in this case he has often the occasion of improving the result by star distances, measured either in the evening after sunset, or in the morning before sunrise; and if in such star distances there be found some lying on the side of the moon opposite the sun, these night observations serve effectually to balance against those made in the day. It is true we cannot say here that observations, although so made on both sides of the moon, but yet at great intervals of time, compose what I have called just now *coupled series;* because it is not exact to assume that the instrument is, during and after these intervals, under the same physical conditions, and in the same degree of adjustment. But, at least, we may be sure that such observations combine in favor of a longitude more advantageously than if they had been all partial, and taken upon one side only of the moon.

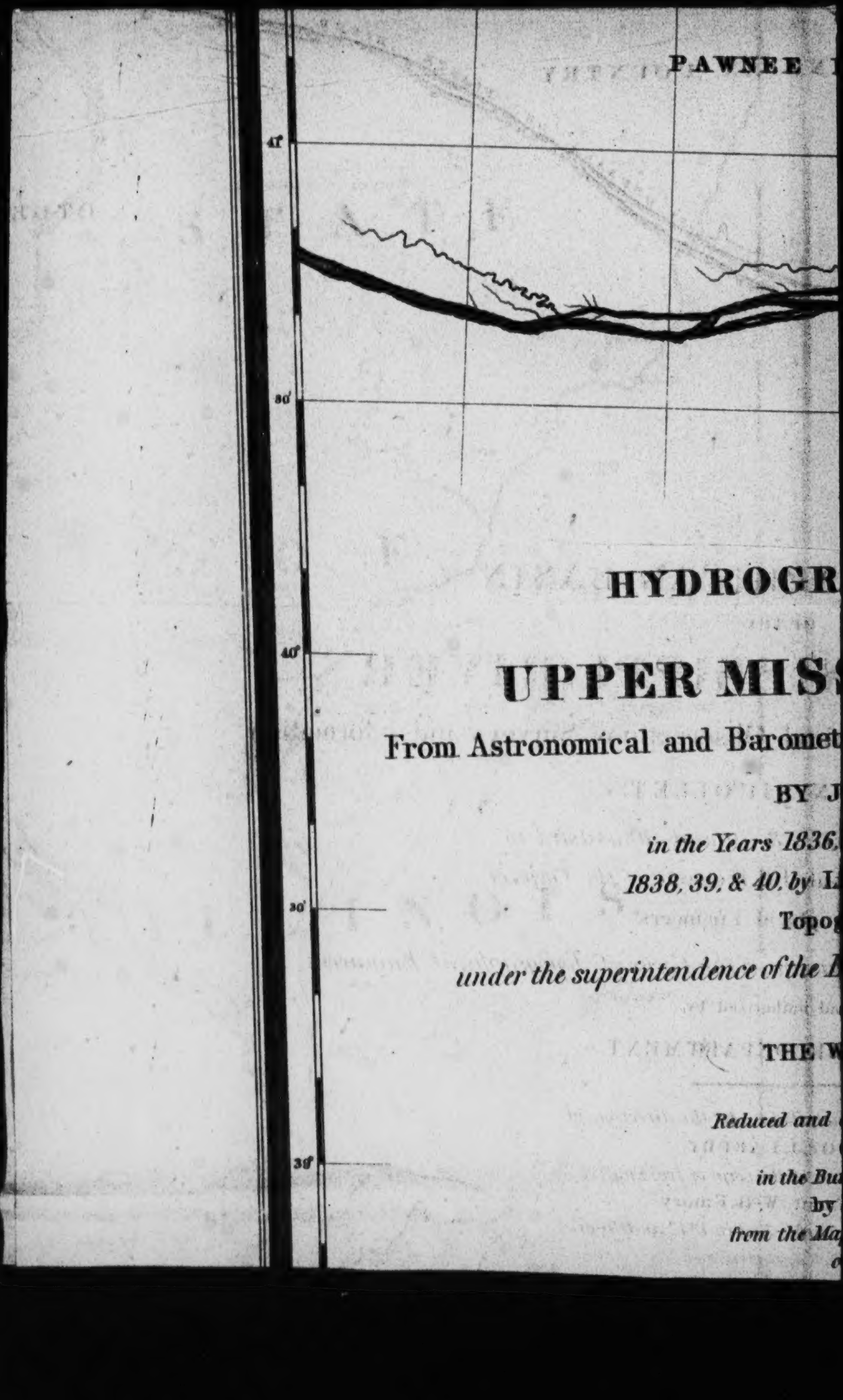
In every case we see that the method is to provide, as much as possible, distances observed to the east and to the west of the moon, and to take the mean between the average of those on one side, and the average of those on the other. In general, five or six couples of series, each series containing 10 or 12 individual observations, are capable of giving a longitude, whose error will be within limits from *one* to *three*, or *four* minutes in arc.

The method of lunar distances may be put in practice on land, as is sometimes done for hydrography; and it becomes, then, of great usefulness, by the facility it affords, with the aid of well-regulated chronometers, of referring to one principal station all the series of distances taken at different stations that have been occupied in several successive days, so as to introduce them all to a concurrent determination of the absolute longitude of this principal station, just as if they had been all made at that one station. In this way the geographer, who can rely upon his chronometer, with sufficient indications of favorable weather for a few days, and is well informed by his guides of the country he has to pass over, may dispense with a long halt at one of his stations, and then gain time—not unfrequently precious, from the circumstances in which he finds himself placed.

It is in accordance with these methods that the observations have been made, from which are deduced the geographical positions presented in the table at the end of this report.

These positions are, in all, 240; of which 39 are due to the labor of others, and have been collected for use, from the sources named in the appropriate column of the table. The remainder, which are my own, are in number 201; resting upon about 600 series of 5 observations each, for the determination of *time;* and about 500 series of from 10 to 20 observations each, for the determination of *latitude and longitude;* making, together, 1,100 series, composed of nearly 11,000 astronomical altitudes and distances.

As to the meteorological observations for the determination of the elevation of the stations above the sea, it is not possible, without a tedious and unnecessary research, to state their number accurately. The table



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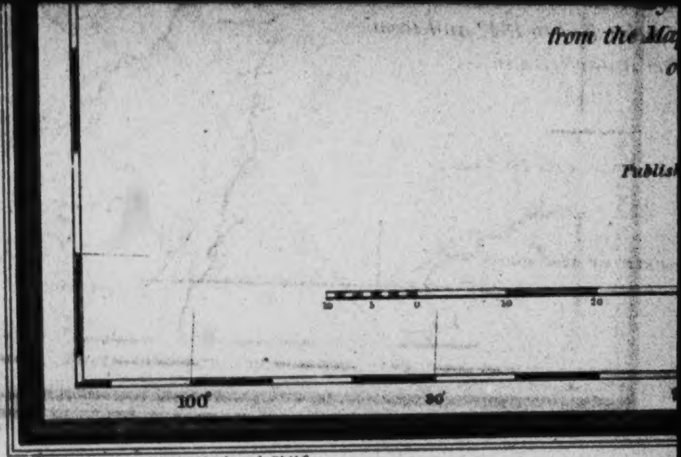

Mountains Engraved by E.F. Woodward Phil^a contains 165 altitudes, the elements of which consist of not less than 10,000 barometric and thermometric readings; and if to these be added what I caused to be observed at various points, to serve for comparison and reduction, we shall not come short of 90,000 meteorological observations, which have had to be availed of in some sort, for this particular, in the geographical positions I present.

The astronomical observations have been made with different sextants. The one most commonly used is of a kind known under the name of *Hopp's improved sextant*, and having a radius of nine inches. Others of six-inch radius, occasionally employed, came from the shop of Mr. Troughton. I was provided with two chronometers; one of which, by Brockbank, especially, has preserved, for two years, a rate truly striking, if one considers the difficulties of the region we had to explore.

The observations of the campaigns of 1838 and 1839 were made by Lieut. Fremont and myself; Mr. Fremont counting the chronometer and reading. But, in the year before, during which I explored the sources of the Mississippi and the adjacent regions, being without an assistant, I had to answer by myself for every part of the observation; and as the stations were constantly at the junction of rivers, or on the shore of some lake, it would be difficult for me to describe what I had to undergo, from wet, from insects, and from want of an organization proper to favor my work.

The elements of the celestial bodies observed, as they were needed for the calculation, were taken from the "Nautical Almanac;" and the calculation of this considerable mass of astronomical observations has been executed by Lieut. Fremont and myself, aided for three months by Lieut. E. P. Scammon, corps of topographical engineers, whose zeal and intelligence on this occasion, as well as the talent with which he has assisted Lieut. Fremont in the construction of the map, insures my gratitude.

The reconnoissance of the country traversed each day, or rather the survey of our route, by land or by water, was made by taking the magnetic bearing of every point, by estimating its distance, and by making, as we went, a connected sketch or bird's-eye view of the whole, and very often including distant points of importance, indicated to us by the guides, to which one of us always went to take note of. This part of the labor I assigned to Lieut. Fremont; and his co-operation during 1838 and 1839, while it left me more time to spend upon other duties, as the chief of the expedition, proved also otherwise advantageous, by the talents which he displayed for this branch of service, and the activity and accuracy which have always characterized whatever he has had occasion to perform under my directions. There has been no exception to this arrangement, unless under some particular circumstances, or in cases where, to gain time, we were divided into two parties, to explore different districts. So, in 1838, while I was making the reconnoissance of the beautiful region to which I have given the name of *Undine*, Lieut. Fremont was employed upon that of the *Waxi-oju river*, *(rivière aux Embarras* of the French,) which falls into the Mississippi seventeen miles below Lake Pepin, and which I supposed then to be a river that would play an important part in some treaty with the Indians, which the Government appeared to project. So, too, in 1839, while we were going up the Missouri, in order not to lose the advantage presented to us in the steamboat of the American Fur Company of St. Louis, upon which we were, which did not run in the night, but made very long day-trips, I divided the work of these daily sketches, of which I have spoken, into three portions. I charged myself with a part commencing at daybreak, and continuing until 9 o'clock a. m.; Lieut. Fremont succeeded me until 2 p. m.; and Mr. Geyer had the rest of the day. It is from these daily sketches that we protracted the map, after the courses and distances had been corrected by the observed geographical positions. All the points known by their latitudes and longitudes being laid down at first upon the map, these points determine the spaces within which must necessarily quadrate all the other points and details procured, directly or indirectly; and in relation to which, means of comparison and control always present themselves naturally; thus assuring a sufficient exactitude for placing points that may not have been actually observed. There remains, then, nothing indeterminate but the form and dimensions of detail-objects, such as lakes, the detours and sinuosities of rivers; things of which we can only come to have precise knowledge by systematic surveys, which it will be the business of civilized men to establish in proportion as they people the country.

It is easy, upon inspecting the map, to recognise those portious of which a reconnoissance or a survey has been made, and such as have been laid down from information merely. Use has been made of the *public land surveys*, which have been liberally furnished us by the land offices, wherever they touched our ground, in Missouri, Illinois, Wisconsin, and Iowa. With regard to the river surveys, which are our own work, I may mention what follows.

The Missouri has been reconnoitred, with care, for a distance of 1,253 miles from its junction with the Mississippi, as far as Fort Pierre Chouteau. All its accidents, physical and geographical, which the scale of the map allowed, have been there expressed. In respect to this, it is much to be desired that the work giving account of the expedition of Lewis and Clarke, now entirely out of print, could have a second edition. This work does not so much recommend itself by the exactness of its survey and astronomical observations; the authors made no pretension of that kind; but it may be considered as one of the greatest, most difficult, and at the same time most happy geographical enterprises that have ever been undertaken, which concerns the honor of the nation, and which merits that of a second edition, by the truth, accuracy, and conciseness of its descriptions. These descriptions, in my judgment and experience, will serve for comparisons useful to geography. They will even come, hereafter, to be useful for the physical history of the mighty Missouri; the effects of which, in the valley it passes through, serve as a standard in investigating the *regime* of large rivers, and in perfecting the hydrographic theory of their flow. If this step were taken, advantage might also be had in correcting a number of errors, which detract from the first edition, and to introduce an addition from the manuscripts of General Clarke, which I think were not consulted at the time. I know no persons who could better be employed upon the publication of a second edition than the sons of this distinguished and modest traveller, aided, if necessary, by the General Government.

The St. Peter's river received the first rectifications of its direction from the second expedition of Major (now Lieutenant Colonel) Long.

But Mr. W. W. Mather, late of the United States army, and at present one of the geologists of the State of New York, was the first to institute a regular survey, when he accompanied Mr. G. W. Featherstonhaugh in his "Geological Reminiscences" through the region of the great lakes, to the Coteau des Prairies. I have made (again assisted by Lieut. Fremont) surveys of this same river, from its junction with the Mississippi up to its sources; which are not, as was supposed, at the foot of the Coteau des Prairies, but among a magnificent group of lakes upon the plateau, and at the very head of the Coteau itself.

The surveys of the rivers Des Moines and *Wazi-oju* were made, under my directions, by Mr. Fremont; those of the St. Croix by Messrs. Henry R. Schoolcraft and Allen, (lieutenant U. S. A.,) in 1832, and by myself in 1837.

The reconnoissance of the Mississippi has been well executed by these same gentlemen, in their expedition of 1832, from Itasca lake to Sandy lake. I do not differ from them, so far as the details are perceptible on the map, over this long route, except as regards the distance between the embouchures of Leech Lake and Pagadewan rivers. This distance, which they make to be at least ten miles, I have made only three miles. The error, probably, is in the information given to these geographers; they having left the Mississippi at the entry of Pagadewan river, (or Lacrosse river,) to get to Lake Winibigoshish; while I had the advantage of returning by Leech Lake river, of visiting the junction of both rivers with the Mississippi, and of taking an approximate position of the first of the two, before encamping upon the point of the great savannah which the Chippeways call *Kichi-bitobig*. There remains still a short portion to the west of Pagadewan river, which neither of us has explored. But a traveller cannot see everything; he has often to yield to circumstances which he cannot influence or control.

In point of fact, there are, in this northern part of the United States, portions of country more unknown now than they were formerly. For example: the districts watered by the Vermillion Lake river and St. Louis river, were, from time immemorial, the way of communicating with the interior as long as the Indian trade was in the hands of the French or the British. But, since the United States have taken possession of the territory south of Rainy river, the intercourse between the Americans and the British traders has entirely ceased. That small region is still a complete wilderness, very little known, and of difficult exploration. It is now laid down from the best information that the Indians could furnish, or the surveys for settling the north boundary could procure. The same may be said of Otter-Tail lake and the sources of the Red river of the North, that are in a country formerly occupied by Indian traders, whom the turbulence of the Chippeways has forced away. As it is still a permanent theatre of the wars of these last with the Sioux, the guides to be procured from either of these tribes refuse to conduct one thither, lest they themselves might fall in with enemies.

I have twice had opportunity of making surveys of the Mississippi from Sandy lake down to St. Peter's, and thence to *Prairie du Chien* and the *Kipi-saging*, or "*obstructed mouth*," (in allusion to the mouth of the Wisconsin,) of the Chippeways, which is below this growing town. As to the first portion, I find it very different from the representations given in existing maps. I suppose that in this the geographers (my predecessors in this region) have preferred to be influenced by the latitudes given by Major Pike, (which are very inexact, as I shall show hereafter,) rather than to trust to their own experience. For instance: the distance from St. Peter's to Sandy lake is generally adopted as from 500 to 600 miles: it is by my surveys only 334 miles, viz: 189 miles from St. Peter's to *Kagi-wigwan*, or Crow-wing river, and 145 miles from this last to Sandy lake.

Finally, in 1839 I made a reconnoissance of the Mississippi from *Prairie du Chien* to the *Lower* or *Des Moines Rapids*. The remainder of this river has been laid down from the public land surveys.

I might mention here, by the way, a fact very capable of modifying the opinion of those who refuse still to believe in the prodigious progress which civilization is making towards these distant and so little known regions. When, in 1836, I ascended the Mississippi to explore its source, its banks between the *Lower Rapids* and *Prairie du Chien* were almost desert—some only of the principal towns of the present day were just coming, as it were, out of the ground; and when, at the close of 1837, I returned to the Eastern cities, I had only too much to answer those who asked my opinion upon the many projects of speculation offered to the public, but existing, as they said, only upon paper. Since that time I have had occasion to devote two summers to the exploration of the regions contained between the Missouri and Mississippi; and when, at the close of 1839, I descended this last by canoe, to reconnoitre the portion between Prairie du Chien and the Lower Rapids, I had to note in my field-book 37 towns, in full development, upon the line where, two years before, there were not to be seen the third part of this number.

I have entered into the preceding detail in order to do justice to the labors of geographers who have preceded me. But I must say that, in the map which I present, I have everywhere preferred surveys made by myself, or by my direction; because they rest upon numerous astronomical observations—an advantage which my predecessors had not. Those who will take the trouble to compare this map with other existing ones will, doubtless, not fail to remark the important alterations which these observations have introduced and justified in the astronomical geography of the vast region it exhibits.

Starting from Engineer Cantonment, the course of the Missouri is inclined more to the northwest—the Great Bend, instead of being turned to the east, faces the north; and of all the embouchures of its tributaries, some are lower, and others a great deal higher in latitude than was formerly supposed.

The geographical position of *Mini-wakan*, or *Devil's lake*, is also much changed. This lake is invested with hills, and is perfectly isolated; it is not, therefore, the source of several rivers falling into the Red river of the North, as drawn upon some maps; though, in times of *overflow*, its waters pass over a depression in the ground, and run into the *Shayen-oju* river. It is the same way with the Mississippi: starting from the Falls of St. Anthony upwards, all the river-mouths bear too much to the west, and are too low in latitude; and even its sources were placed more than three-quarters of a degree too *far* to the *west*. Upon this line there is one important mouth, the erroneous position of which has, till now, created great disorder in the geography of this region—I mean the mouth of the *Kagi-wigwan*, or Crow-wing river, the latitude of which, as given by Major Pike, is 27 minutes short.

All these circumstances tended, in a singular manner, to contract the extensive region between the Mississippi and the Missouri; so that there was not, so to speak, *room* for the intermediate territories which I had explored. But my astronomical observations have throughout restored order. The Missouri being thrown over to the west, and the Mississippi to the east, while at the same time the latitudes are generally increased, each intermediate country has found its natural place.

In fine, the Mississippi may be said to be now well known. I give, in the Table of Geographical Positions, already referred to, the numerous positions by which it is determined; not that the lower part enters into my map, but because these positions form a *complete system* in regard to this majestic river—one of the most magnificent in the world, and even also now one of those whose course is astronomically the best determined from its embouchures to its very source.

I return now, in relation to the map, to the problem of the longitudes; which here, as everywhere else on the earth, demands numerous observations, against which a *war-cry* will continually be heard among geographers, as long as in their works of exploration they are restricted to chronometric methods, lunar distances, eclipses, and other phenomena of rare occurrence, without being provided with the ample means which science can indicate, but cannot furnish, except when national governments contribute by an allowance of both time and funds. In this aspect, I look upon it as my duty to expose here the elements which have served in the determination of the principal longitudes of my map; so that observers who may follow me over the ground it covers may know where to direct their efforts for improving these first results.

When the calculations of the astronomical observations in which we were engaged were a little advanced, I detached Lieutenant Fremont to commence the construction of the map—charging myself with the calculation of the remaining observations, the long and tedious discussion of the longitudes, and the computation of the meteorological observations which I had brought together for determining the altitudes of the stations above the sea.

It was necessary for us, in the outset, to have some positive meridians as well known as possible. In this regard I had been fortunate enough to have observed some occultations of fixed stars, and also the solar eclipse of the 18th of September, 1838. The reverend Mr. Vérot had the kindness to make for me the calculation. But at this period I had not been able to procure the particulars of corresponding observations, nor the errors of the tables as to the epochs of these phenomena. I was obliged, therefore, to employ the elements for the calculations as they were given in the Nautical Almanac. However, as the results could not be so much in error as to affect sensibly the exactness of the construction of the map, I did not hesitate to adopt them for the concurrent determination of the longitudes, which I especially wanted.

At a later period I had the pleasure to make acquaintance with Mr. S. C. Walker, of Philadelphia, a distinguished astronomer, whose zeal and industry are efficaciously contributing to the progress of astronomy in the United States. Mr. Walker had taken the pains to form an extensive catalogue of all important astronomical phenomena which have been observed at different times in North America. He has progressed far in the discussion and the reduction of the observations upon occultations and solar eclipses; and we may be assured that, if Mr. Walker (hitherto without public encouragement in the science which he cultivates with such predilection) could be placed in a position to finish the considerable task he has undertaken, it would result in honor to the country, a large and useful contribution to science, and numerous elements of advancement for astronomical geography on this continent. On another hand, Professor E. O. Kendall has computed the co-ordinates of the solar eclipse of the 18th of September, 1838; and, as he himself remarks, "The reduction of future observations of solar eclipses will be much facilitated by the publication of these co-ordinates in the Berlin Jahorbuch since 1839."

Having communicated my observations to these gentlemen, they at once distributed between themselves the task of their comparison and reduction, by applying the errors of the tables. I consider myself, then, as indebted to them, not only for having saved me from long calculations, but still more, that from the care which they have taken to verify their respective computations, the results they have deduced offer, for their correctness, a double security.

The following table exhibits the reductions respecting my observations, and those with which they have been compared:

TABLE I.

Date.	Phenomenon.	Place of observation.	Local mean time of observation.	Resulting longitude, not corrected for error of tables, (d').	a	b	c
			h. m. s.	h. m. s.			
1838.							
June 30	Imm. α Virginis	Red Pipe-stone quarry	10 43 7.28	—6 25 10.99	+1.990	—0.389	+2.028
September 18	⊙ eclipsed, end	Ti-tanka-tanninan lake	4 18 6.85	—6 12 58.96	+2.204	—0.115	—2.207
September 18	Do. begin	Goebel's residence -	1 53 16.77	—6 3 55.69	+2.203	—0.720	+2.318
September 18	Do. end -	Goebel's residence -	4 40 42.22	—6 3 51.17	+2.204	—0.033	—2.204
1839.							
July 6	Em. η Tauri -	Coteau du Missouri	15 49 35.50	—6 36 25.01	+1.665	+0.027	—1.665
July 6	Imm. η Tauri -	Hudson observatory	16 2 21.67	—5 25 53.75	+1.665	—0.363	+1.704
July 6	Do. η Tauri -	Washing'n City obs.	16 20 17.40	—5 8 10.85	+1.665	—0.741	+1.823
July 6	Do. η Tauri -	Philad'a observatory	16 30 26.14	—5 0 45.66	+1.665	—0.774	+1.837
November 20	Do. η Tauri -	St. Louis, Mo. -	6 12 14.70	—6 0 54.69	+1.568	—0.534	+1.655
November 20	Do. η Tauri -	Dorchester observ'y -	7 46 27.40	—4 44 17.22	+1.568	—1.503	+2.172
1841.							
June 5	Imm. σ Sagittarii	Goebel's observatory	15 40 7.94	—6 4 26.96	+2.016	—1.454	+2.485

In the proceedings of the American Philosophical Society, (No. 5, vol. 1, p. 231,) are to be found the positions of several American places of observation furnished by Messrs. Walker and Kendall. The following are here introduced, as stations of comparison:

TABLE II.

Places.	Observers.	North latitudes.			West of Greenwich longitudes.		
					h.	m.	s.
Hudson observatory, Ohio - -	Professor Loomis -	41°	14′	37″	5	25	47.46
Washington City observatory, D. C. -	Lieut. Gillis, U. S. N. -	38	53	31	5	8	6.08
Philadelphia High School observ'y, Pa.	Professor Kendall -	39	57	8	5	0	41.90
Dorchester, Mass. - - -	Mr. Bond, (private obs'y)	42	19	15	4	44	17.81

The method used in making the reductions is that of Bessel, given in the Astronom. Nachricht, No. 321. The sun's semi-diameter there given has been employed; the other elements are taken from the Nautical Almanac. Bessel's semi-diameter of the sun is less than that in the Nautical Almanac by 1″.112. The ellipticity of the earth is assumed at 0.00324. Then, after Bessel, we have

$$d = d' + a\iota + b\zeta + c\nu \quad \text{(A)}$$

Wherein

d = corrected longitude + when east, — when west of Greenwich.

d' = resulting longitude, not corrected for the errors of the tables.

ι = the correction of the tabular place of the moon on its true orbit.

ζ = the correction of the tabular place of the moon on a perpendicular to its orbit.

ν = the correction of the tabular sum of the semi-diameters of the sun and moon, in the case of a solar eclipse; or, merely the correction for this error of the moon's semi-diameter in the case of a star's occultation.

With these elements and co-ordinates, the values of d', and the coefficients a, b, c, have been computed as given in the above table.

With these preliminary remarks, I shall proceed to indicate in what manner the corrected longitude has been deduced for each place where the errors of the tables and corresponding observations could be procured; and to show, at the same time, in what manner these longitudes have concurred with other deductions to a final and adopted value, for the longitude of such place.

But, it must be remarked, that in combining several partial results, with the view of obtaining the final longitude, I have not paid any regard to what is called the *due weight* of each observation; satisfying myself with taking the arithmetical mean of all the partial results. Indeed, in most of the cases, I should be at a loss how to determine such a proper weight. I therefore leave to everybody the care of doing, in that respect, what they may think the best.

I. RED PIPESTONE QUARRY.

For the occultation of α *Virginis*, observed at this place, I am not able to find any corresponding observations. I have therefore to take the resulting longitude, as given in the preceding Table I, uncorrected. We have, then,

	h.	*m.*	*s.*
Longitude deduced from the occultation - - -	6	25	10.99
Longitude by 4 sets, or 60 lunar distances, east and west ☽	6	25	24.50
Mean - -	6	25	17.74
Longitude in arc -	96°	19′	26″.1

II. COTEAU DU MISSOURI—ENCAMPMENT 6TH JULY, 1839, ON WESTERN SLOPE.

The Table I shows that the occultation of η *Tauri*, observed here, may be compared with corresponding observations of the same star, made at three different places in the United States.

In a recent number of the Astronom. Nachricht, Bessel gives the correction of the right ascension and declination of η *Tauri*, as used in the Nautical Almanac, viz: $\triangle \text{Æ} = 0''.9$ *in arc*, and $\triangle D = -2''.5$ *in arc*; whence $\varepsilon' = +1''.460$ and $\zeta' = +2''.617$.

Using the longitudes of the stations of comparison, as given above, and applying the corrections $a\varepsilon'$ and $b\zeta'$ in the formula (A), we have

	h.	*m.*	*s.*
Longitude by comparison with Hudson observatory -	6	36	17.70
with Washington city -	6	36	18.23
with Philadelphia - -	6	36	19.15
Mean - -	6	36	18.36
Longitude in arc -	99°	4′	35″.4

III. ST. LOUIS—THE CATHEDRAL.

For the occultation of η *Tauri*, observed here on 20th November, 1839, we have to use the corrections of the star's place, as at the preceding station. We find, besides, by the Greenwich observations of the same day, for the corrections of the moon's right ascension and declination—

$\triangle \text{Æ} = -6''.6$ in arc: and $\triangle D = -4''.65$ in arc, when $\varepsilon = -7''.014$ and $\zeta = -2''.956$.

There is but one place of comparison—Dorchester, Massachusetts, at Mr. Bond's private observatory. Applying, then, the values $a\varepsilon'$, $a\,(\varepsilon + \varepsilon')$ and $b\zeta'$, b, $(\zeta + \zeta',)$ we find:

	h.	*m.*	*s.*
Longitude by comparison with Dorchester observatory -	6	0	52.73
with Greenwich meridian obs'y	6	0	55.60
Mean - - - -	6	0	54.16

Mr. Walker thinks the first of these results as likely to be correct as the second, on account of the uncertainty whether the value of $\nu = +3''$ used by Mr. Airy in reducing the Greenwich observations, applies to occultations, for which Burckhardt's semi-diameter is, perhaps, better adapted. In this instance, however, the mean of the two naturally presents itself for acceptance. We have, then, in fine—

	h.	*m.*	*s.*
Mean longitude from the occultation - - -	6	0	54.16
Chronometric longitude deduced from Baltimore - -	6	0	56.72
Mean of 15 sets, or 224 lunar distances E. and W. ☽ -	6	0	71.15
Mean - - - - -	6	1	0.68
Longitude in arc - - -	90°	15′	10″.2

IV. TI-TANKA-TANNINAN LAKE—EAST SHORE.

For the observation of the end of the solar eclipse, made here on the 18th of September, 1838, I was supplied with a telescope of Dolland, having a magnifying power of about 120.

By Professor Kendall's memoir on the longitude of several places in the United States, deduced from observations of this same eclipse, we see that, using his co-ordinates, computed after the method of Bessel, viz:

$$\iota = -14''.782$$
$$\zeta = -\ \ 7''.310$$
$$\nu = +\ \ 3''.198$$

These values, with their corresponding co-efficients in Table I, applied, give, for the longitude of Ti-tanka-tanninan - 6*h.* 13*m.* 23.56*s.*

Longitude in arc - - 93° 20′ 53″.4

V. GOEBEL'S RESIDENCE, NEAR NEWPORT, FRANKLIN COUNTY, MISSOURI.

1. Mr. David W. Goebel, from Coburg, Germany, well acquainted with practical astronomy, and supplied with a Hadley's sextant, a good clock, and a telescope having a magnifying power of about 40 times, has been kind enough, at my request, to observe for the solar eclipse of the 18th of September, 1838. The authentic data of the observations are as follows:

Beginning at 1*h.* 59*m.* 13.3*s.*, true time of the place.
Ending at 4 46 41.2 do. do.

The conversion of this *time* into *mean* time, gives the date of the observation as represented in Table I. Now, introducing into the formula (A) the values of ι, ζ, & ν, employed for the preceding station, together with the corresponding co-efficients, *a*, *b*, and *c*, in Table I, we derive for the longitude of Goebel's residence—

	h.	*m.*	*s.*
By beginning of eclipse - - - - -	6	4	30.41
End - - - - - - -	6	4	16.45
Mean - - - -	6	4	23.43

In his communication to me, Mr. Goebel states, that the end of the eclipse could not be observed quite as well as the beginning, owing to a small twig only observable through the telescope, which came right between the sun and the instrument at the critical moment. Still, he is satisfied that the time of the observation comes within five seconds of the utmost accuracy. Unwilling to assume, myself, any corrections in reference to this accidental error, and considering the nature and difficulty of the sort of observation, I feel disposed to regard both epochs, of beginning and end, as equally good, and the mean above taken as not far from the truth.

I may remark, with Mr. Walker, that the low power used by Mr. Goebel will give a diminished semi-diameter, requiring a value for ν of only $+0''.147$, instead of $+3''.198$.

2. Mr. Goebel has also observed the occultation of σ Sagittarii by the moon on the 5th of June, 1841, at 15*h.* 40*m.* 7.94*s.* mean time. No corresponding observations have been found: the result, therefore, stands incorrected for the errors of the tables. It gives, according to the reduction by Mr. Walker, longitude of Goebel's residence, 6*h.* 4*m.* 26.96*s.*

3. Mr. Goebel has farther derived, from observation of 4 emersions and 2 immersions of the first satellite of Jupiter, a longitude of 6*h.* 4*m.* 35.52*s.*

Combining these three several deductions for a mean result, we have—

	h.	*m.*	*s.*
Longitude by eclipse of the sun - -	6	4	23.43
Longitude by occultation of σ Sagittarii - -	6	4	26.96
Longitude by satellite of Jupiter - -	6	4	35.52
Mean - - -	6	4	28.64
Longitude in arc - -	91°	7'	9".6

I pass, now, to some places where there has been no opportunity of observing occultations or an eclipse, but whose longitude has been determined by lunar distances; or, chronometrically, by comparison with the preceding stations.

VI. ST. PETER'S—INDIAN AGENCY NEAR FORT SNELLING.

Entrance of the St. Peter's river, called Mdota-mini-sotah by the Sioux.

	h.	*m.*	*s.*
1. Longitude, the mean of 10 sets of observations, or 198 lunar distances E. and W. ☽ - - -	6	12	13.6
2. Chronometric longitudes, deduced from the eclipse of the sun, observed at Ti-tanka-tanninan lake -	6	12	26.6
3. Chronometric longitude, deduced from the occultation of α *Virginis*, observed at Red Pipestone Quarry -	6	12	16.8
4. Chronometric longitude, inferred from St. Louis -	6	12	21.3
Mean - - - -	6	12	19.58
Longitude in arc - - -	93°	4'	53".7

VII. PRAIRIE DU CHIEN—AMERICAN FUR COMPANY'S HOUSE.

	h.	*m.*	*s.*
1. Longitude, the mean of 3 sets or 34 lunar distances E. and W. ☽ - - - - - -	6	4	36.57
2. Chronometric longitude, inferred from St. Louis -	6	4	42.84
3. Chronometric longitude, inferred from St. Peter's -	6	4	27.25
Mean - - - -	6	4	35.55
Longitude in arc - - -	93°	8′	53″.25

VIII. TRAVERSE DES SIOUX—AMERICAN FUR COMPANY'S HOUSE.

	h.	*m.*	*s.*
1. Longitude, the mean of 3 sets or 36 distances from the moon to the sun - - - -	6	15	51.73
2. Chronometric longitude, inferred from St. Peter's -	6	15	45.10
3. Chronometric longitude, deduced from the occultation of *α Virginis*, at the Red Pipestone Quarry -	6	15	55.57
Mean - - - -	6	15	50.80
Longitude in arc - -	93°	57′	42″.0

IX. MOUTH OF SANDY LAKE RIVER—AMERICAN FUR COMPANY'S HOUSE.

	h.	*m.*	*s.*
1. Longitude, mean of 2 sets or 23 distances from the moon to the sun, taken in the morning - -	6	12	48.8
2. Mean of 2 sets or 25 distances from the moon to the sun, taken in the afternoon - - -	6	12	28.2
Mean - - - -	6	12	38.0
Longitude in arc - - -	93°	9′	37″.5

X. SOURCES OF THE MISSISSIPPI RIVER—STATION AT ITASCA LAKE, SCHOOLCRAFT'S ISLAND.

	h.	*m.*	*s.*
1. Longitude, mean of 2 sets or 24 lunar distances E. of the moon - - - - - -	6	20	22.15
2. Mean of 2 sets or 24 lunar distances W. of the moon, taken on the same evening with the former	6	19	53.60
Mean - - - -	6	20	7.87
Longitude in arc - - -	95°	1′	58″.0

XI. HUPPAN-KUTEY PRAIRIE—AMERICAN FUR COMPANY'S HOUSE.

	h.	m.	s.
1. Longitude, mean of 8 sets or 76 lunar distances E. and W. ☽ - - - - - - -	6	26	56.72
2. Chronometric longitude, inferred from station near Engineer Cantonment - - - - -	6	26	38.00
Mean - - - - -	6	26	47.36
Longitude in arc - - - -	96°	41′	50″.4

XII. MINI-WAKAN LAKE, OR DEVIL'S LAKE—SECOND OR MIDDLE STATION ON SOUTH SHORE, MARKED ON THE MAP.

	h.	m.	s.
1. Longitude, mean of 8 sets or 87 distances from the sun to the moon - - - - - - -	6	33	58.18
2. Chronometric longitude, deduced from the occultation at the Coteau du Missouri - - - -	6	33	45.26
Mean - - - - -	6	33	51.72
Longitude in arc - - - -	98°	27′	55″.8

XIII AND XIV. ENGINEER CANTONMENT, AND ASTRONOMICAL STATION BETWEEN ENGINEER CANTONMENT AND COUNCIL BLUFFS.

In the account of an expedition from Pittsburg to the Rocky Mountains, under the command of Major Stephen H. Long, United States topographical engineers, we find a table of latitude and longitude observed at different points of the country explored by the expedition. One of the geographical positions thus given is particularly interesting to me, because it comes within the field of my labors, and because it was carefully determined during the period spent at it—I mean Engineer Cantonment, a few miles below Council Bluffs.

According to the statement given in the second volume of the work referred to by my friend J. D. Graham, at the time lieutenant United States artillery, and now major United States topographical engineers, the resulting longitude deduced from the astronomical observations made in the winter of 1819–'20, is—

Mean of 5 sets of lunar distances, and 3 emersions of Jupiter's satellites, 95° 43′ 53″.

The other astronomical station mentioned in the caption afforded me the opportunity of verifying both its longitude and the daily rate of my chronometer.

I could not land immediately at Engineer Cantonment, owing to the washing away on the eastern bank of the Missouri river, which has for some years left inland to the western side the former station. But, fortunately for me, many sand-bars compelled our steamboat to lie by for a day and two nights. We encamped, therefore, on an island which occurs in the Great Eastern Bend, about six miles above Engineer Cantonment, and three below Council Bluffs, by water. According to Lieutenant Fremont's reconnoissance, the island is two or three miles west of the meridian of Engineer Cantonment.

The daily rate of the chronometer, ascertained as well as could be, in two successive nights, and proving very nearly the same as at St. Louis, we have for the longitude of the island, as inferred from St. Louis, 95° 45′ 30″.

When we consider the respective positions of the island, and of Engineer Cantonment, the longitudes of the two places accord sufficiently to induce the belief that the error which may still affect them is so small as to be of very little consequence in geographical purposes.

XV. FORT CHARLOTTE—OLD AMERICAN TRADING-HOUSE—NORTHWEST COMPANY'S COAST OF LAKE SUPERIOR, AT THE WEST END OF THE GRAND PORTAGE.

My friend Mr. James Ferguson, the astronomer of the American commission for determining the northern boundaries, and now one of the principal assistants in the coast survey under the superintendence of Mr. Hassler, who has furnished me with valuable information in regard to this section of country, has observed at this place the solar eclipse of the 26th of June, 1824. He has communicated to me the data and conclusions of his observation, which was with a telescope of 2½ feet focal length, having a magnifying power of about 60 times. The data are as follows:

June 26, 1824. Beginning of the eclipse at 6*h.* 7*m.* 1*s.*, p. m. mean time.
End - - - 7 13 19.2 do. do.

The result of the calculation, without referring to corresponding observations, or correcting for the errors of the tables, gives for the longitude 89° 59′ 31″.

XVI. FORT WILLIAM, AT THE ENTRANCE OF KAMINISTIQUIA RIVER, NORTHWEST COAST OF LAKE SUPERIOR.

Longitude from Sir J. Franklin's second expedition, appendix Table I - - - - -	89°	16′	30″
From the commission for settling the boundary, appendix cxxx - - - - - -	89	22	40
From the solar eclipse at Fort Charlotte by Mr. Ferguson - - - - - - -	89	20	18
Mean longitude in arc - - -	89	19	49.3

From Sir J. Franklin's second expedition, *ubi supra* -	48°	23′	40″
By Mr. Ferguson, mean of 35 sets of observations -	48	23	11
Mr. J. E. Colhoun—Major Long's expedition - -	48	23	33
Mean latitude - - - - -	48	23	28

XVII. DELTA OF THE MISSISSIPPI RIVER.

An important work, ordered by Congress, in relation to the improvement of the navigation of the mouth of the Mississippi, was executed in 1838 and 1839, under the direction of Captain A. Talcott. A triangulation, from a base of about two miles in length, has been spread over the lower delta. The latitude of a point designated as the *astronomical station*, has been determined by 157 observations upon 22 fixed stars selected for the purpose. The difference of zenith distance of those stars, by pairs, was measured directly by a spider-line micrometer, applied to a 42-inch altitude and azimuth telescope, made by Troughton and Simms. In addition, a series of observations was made for determining the longitude, by observing the transit of the moon, and such stars as are given in the Nautical Almanac under the head of *moon culminating stars;* and such other observations on high and low stars as would furnish data for correcting all instrumental errors.

The position of the astronomical station on Balize bayou, Northeast Pass, is concluded to be in latitude 29° 7′ 4″.59 north, longitude 89° 4′ 32″.57 west of Greenwich.

From this point, Capt. Talcott has deduced the positions of all the important points embraced in his survey; and it is from the unpublished account of his valuable work that I have been allowed to select the results for the main passes of the mouth of the Mississippi, which are introduced in the Table of Geographical Positions.

XVIII. NEW ORLEANS—THE ROMAN CATHOLIC CATHEDRAL.

The longitude of this place has been variously stated in the course of the past half century. In the *Connaissance des Tems* from 1793 to 1829, inclusive, it is given, under the authority of the French academicians, at *5h. 59m. 53.5s.* west of Greenwich.

In England, the useful *Requisite Tables* make it to be *5h. 59m. 55s.*

Don José Joachim de Ferrer, in his valuable list of geographical positions, published in the *Connaissance des Tems* for 1817, increases this longitude to *6h. 0m. 24s.*

Since that period, this last longitude has superseded the first two above quoted, with the exception that some slight changes have been introduced, from time to time, by different authorities; such as the *Connaissance des Tems* from 1830 to 1843, inclusive, and the American Almanac for the same period. In the absence of the data upon which these various results have been founded, it would be difficult for me even to have an opinion as to which should be adopted, were it not that the work of Capt. Talcott, spoken of in the last article, affords me, in connexion with what I had before myself the means of offering, some new data for the discussion of this interesting question.

In the latter part of May, 1835, I spent three days at the pilot-house on the east bayou of the Southwest Pass. I made the latitude of that place = 29° 59′ 34″, and the difference of longitude east of the Cathedral of New Orleans = *2m. 45s.*

Taking the absolute longitude of the same station as determined by Capt. Talcott, and combining it with my observed difference, we have longitude of New Orleans Cathedral 6*h.* 0*m.* 1*s.*

In January, 1840, Major J. D. Graham, of the United States topographical engineers, on his way to the Sabine river, to survey the boundary between the United States and Texas, observed the difference of longitude between New Orleans and one of Capt. Talcott's stations—the new Southwest Pass light-house. He was supplied with three chronometers;

upon one of which, in particular, he could place great reliance. He had not the opportunity of observing, himself, for the *time*, at New Orleans; but adopted it as furnished to him by Mr. Lelley, who rates and regulates chronometers habitually, and who is provided with a transit instrument for the purpose. The difference between the two places he found to be, by the means of the three chronometers, 2*m.* 26.3*s.*, which, combined with the longitude of the light-house station, as determined by Capt. Talcott, gives for the longitude of New Orleans Cathedral 5*h.* 59*m.* 52.1*s.*

Mr. Edmund Blunt, now one of the principal assistants in the coast survey of the United States, has also furnished me, in this regard, with the results of the observation of two chronometers which have been used in twenty-five voyages between New Orleans and Brooklyn. The mean of the three different methods of rating, habitual among those who regulate marine chronometers, has been taken for the difference of time between the two places. The longitude of Brooklyn has been given directly by chronometers transported there from Greenwich, on board the steamer British Queen, during three trips of that vessel; the mean of which has been taken, and the same longitude, to little more than 1", has been given by direct comparison with the City Hall of New York, whose longitude has been determined by the solar eclipses of May, 1836, and September, 1838. The mean of those two comparisons has been taken by me as the longitude of Brooklyn; and the combination of this with the mean of the chronometers, as above said, has given for the longitude of New Orleans Cathedral 5*h.* 59*m.* 59.66*s.*

These later results come quite near to the earlier ones of the French academicians and of the Requisite Tables, to which, of course, we must allow proportionate weight, and seem almost to confirm them. Now, I do not mean to say that Ferrer's longitude, or that given by Mr. R. T. Paine in the American Almanac, is too great by 20 or 24 seconds: it is repugnant to decline the authority of such zealous and intelligent observers; and I by no means intend that what I at present offer is to be taken as decisive of a question which, for settlement, would demand a fuller and more minute investigation than is suitable here. But, being obliged to adopt a longitude for insertion in the Table of Geographical Positions, I have taken it as follows:

	h.	*m.*	*s.*
Longitude stated by the French academicians - -	5	59	53.5
Requisite Tables - -	5	59	55.0
Chronometer comparisons of Major Graham - -	5	59	52.1
from Mr. Blunt - -	5	59	59.66
of I. N. Nicollet - -	5	59	61.0
And the mean longitude of New Orleans Cathedral -	5	59	56.25
Longitude in arc - - -	89°	59′	3″.75

It is to be hoped that future geographers will avail themselves of opportunities that may be afforded them in visiting this point, to contribute to the clearing up of the discrepancy yet existing, and to the determination of the absolute longitude of this important place.

I. N. NICOLLET.

BALTIMORE, *February* 25, 1843.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS.

Mississippi river at low water.

Places of observation.	Estimated distances by water.		Altitudes above the Gulf of Mexico.*	North latitudes.			West of Greenwich.						Authorities, &c.
	From place to place.	From the Gulf of Mexico.					Longitudes in time.			Longitudes in arc.			
Mouths of the Mississippi—	*Miles.*	*Miles.*	*Feet.*	°	′	″	*h.*	*m.*	*s.*	°	′	″	
Northeast pass. The old Balize of the French and pilot-house	-	-	-	29	7	15.3	5	56	18.44	89	4	36.6	Captain A. Talcott.
Northeast pass. Light-house at the entrance	-	-	-	29	8	32.8	5	56	5.52	89	1	22.9	do.
South pass—light-house at the entrance	-	-	-	28	59	42.3	5	56	29.40	89	7	27.1	do.
Southwest pass. The new balize and pilot-house on the East bayou	-	-	-	28	59	49.5	5	57	15.88	89	18	58.2	do.
Southwest pass. The new light-house, completed January, 1840	-	-	-	28	58	50	5	57	25.80	89	21	27	do.
New Orleans Cathedral, and level of its front pavement	104	104	10.5	29	57	23	5	59	56	89	59	4	
NOTE.—Level of the Mississippi above the Gulf of Mexico, 0.5 foot. Greatest depth of the Mississippi at low water, 113 feet. Range between high and low water, 13 feet.	-	-	-		-			-			-		Albert Stein, C. E.
Red river, north end of the island, opposite the mouth	236	340	76	31	2	25	6	6	45	91	41	15	Nicollet.
Natchez, light-house	66	406	86	31	33	37	6	5	53.5	91	28	22.5	do.
General level of the city	-	-	264										
NOTE.—Range between high and low water in 1835, 52 feet.													
Yazoo river, the mouth	128	534	-	32	28	0	6	3	58	90	59	30	Ferrer.
White river, Montgomery's Landing, one mile above the mouth	220	754	202	33	57	20	6	1	47	90	26	45	Nicollet.

New Madrid, Missouri - - - -	361	1,115	-	36	31	30	5	57	49	89	27	15	Ferrer.
Ohio river, north side of the mouth - -	101	1,216	324	37	0	25	5	56	10	89	2	30	Ferrer's longitude.
Cape Girardeau - - - - -	41	1,257	-	37	18	39	5	57	8	89	17	0	Long's first expedition.
St. Genevieve, Catholic church, and level of its pavement - - - - -	73	1,330	372	37	59	47	6	0	44.7	90	11	10	Nicollet.
St. Louis, garden of the Cathedral - -	60	1,390	382	38	37	28	6	1	2.6	90	15	39	do.
Illinois river, the mouth - - - -	36	1,426	-	38	58	12		-			-		Long's first expedition.
Moingonan river, (*Des Moines river,*) a small island at the mouth - - - -	168	1,594	444	40	21	43	6	6	10	91	32	30	Nicollet.
Montrose, or old Fort Des Moines, the mouth of the creek - - - - -	15	1,609	470	40	30	34	6	6	4	91	31	0	do.
Flint river, the mouth above Burlington - -	30	1,639	486	40	52	56		-			-		do.
Maskudeng, the middle mouth of the slough -	39	1,678	505	41	14	47	6	5	26	91	21	30	do.
Rock island, a quarter of a mile above Davenport's residence - - - - - -	44	1,722	528	41	31	50		-			-		do.
Head of the Upper Rapids, below Port Biron and Parkhurst - - - - - -	15	1,737	554	41	36	8	6	1	56	90	29	0	do.
Prairie du Chien, (Kipi-saging,) American Fur Company's house - - - - -	195	1,932	642	43	3	6	6	4	37.3	91	9	19.5	do.
Summit of bluff on the eastern side of Prairie du Chien - - -	-	-	1,010										
Cap-à-l'ail, the summit—height above the Mississippi 355 feet - - - - -	32	1,964	1,013		-			-			-		do.
Upper Iowa river, island at the mouth - -	14	1,978	-	43	29	26	6	4	40	91	10	0	do.
Hokah river, (Root river,) the mouth - -	23	2,001	-	43	47	0	6	4	46	91	11	30	do.
Prairie à la Crosse river, the mouth - -	3	2,004	-	43	49	0	6	4	56	91	14	0	do.
Sappah river, or Black river, opposite the old mouth - - - - -	31	2,035	683	43	57	14	6	5	36	91	24	0	do.
Top of mountain on right bank, opposite the old mouth - - - -	-	-	1,214		-			-			-		do.
Dividing-ridge between Sappah river and Prairie à la Crosse river, 6 miles east of Mississippi - - - -	-	-	1,103		-			-			-		do.
Mountain island, or *Montagne qui trempe à l'Eau* of the French - - - - -	7	2,042	-	44	1	7	6	6	2	91	30	30	do.
Miniskah river, or White-water river - -	27	2,069	-	44	12	36	6	7	25	91	51	15	do.
Wazi-oju river, or Pinewood river, (*Rivière aux Embarras* of the French) - - -	1	2,070	-	44	13	20	6	7	22	91	50	30	do.
At Roque's, two and a half miles below Chippeway river - - - - -	14	2,084	-	44	23	24	6	8	0	92	0	0	do.

* The numbers in this column refer to the surface of the water in the Mississippi at the point mentioned, except when otherwise specially expressed.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Places of observation.	Estimated distances by water.		Altitudes above the Gulf of Mexico.	North latitudes.			West of Greenwich.						Authorities, &c.
	From place to place.	From the Gulf of Mexico.					Longitudes in time.			Longitudes in arc.			
	Miles.	*Miles.*	*Feet.*	°	′	″	*h.*	*m.*	*s.*	°	′	″	
Clear Water river, the mouth, northwest corner of Lake Pepin	-	-	-	44	36	20	6	9	40	92	25	0	Nicollet.
Reminicha, (*Montague la Grange* of the French) upper end of Lake Pepin	31	2,115	714	44	33	30	6	10	4	92	31	0	do.
Top of Reminicha	-	-	1,036		-			-			-		do.
La Hontau river, the mouth—(Cannon river of the Americans, Canoe river of the French)	3	2,118	-	44	34	0	6	10	8	92	32	0	do.
St. Croix river, the mouth	32	2,150	729	44	45	30	6	11	0	92	45	0	do.
Upland on the banks of the Mississippi and Lake St. Croix	-	-	866		-			-			-		do.
St. Peter's, the mouth	42	2,192	744	44	52	46	6	12	19.6	93	4	54	do.
General level of the plateau on which Fort Snelling and the Indian agency stand	-	-	850		-			-			-		do.
Pilot Knob, the top	-	-	1,006		-			-			-		do.
Falls of St. Anthony, United States cottage	8	2,200	856	44	58	40	6	12	42	93	10	30	do.
Ishkode-wabo river, or Rum river, the mouth	19	2,219	-	45	15	0		-			-		do.
Karishon river, (Sioux,) or Undeg river, (Chippeways,) Crow river of the Americans	10	2,229	-	45	16	0		-			-		do.
St. Francis river, Wicha-niwa river of the Sioux	9	2,238	-	45	20	30		-			-		do.
Migadiwin creek, or War creek, the mouth	18	2,256	-	45	18	14	6	15	50	93	57	30	do.
Kawakomik river, or Clear Water river, the mouth	24	2,280	-	45	24	25	6	16	30	94	7	30	do.
Round island, at the lower end of Osakis rapids	-	-	-	45	35	0	6	16	48	94	12	0	do.
Osakis river, the mouth	22	2,302	-	45	35	35	6	16	48	94	12	0	do.
Watab river, the mouth	3	2,305	-	45	37	0	6	16	58	94	14	30	do.
Pekushino river, the mouth	18	2,323	-	45	46	50	6	17	14	94	18	30	do.
Wabezi river, or Swan river, a half mile above the mouth	18	2,341	1,098	45	54	30	6	17	28	94	22	0	do.
Omoshkos river, or Elk river, the mouth	10	2,351	-	46	4	0	6	17	4	94	16	0	do.

Nokay's river, the mouth - - - - -	18	2,369	-	46	10	30	6	17	15	94	18	45	do.
Kagi-wigwan river, the mouth, (*Aile de Corbeau river* of the French—*Crow-wing river* of the Americans) - - - - -	12	2,381	1,130	46	16	50	6	17	31	94	22	45	do.
Nagadjika river, opposite the mouth - -	18	2,399	-	46	26	0		-			-		do.
Pine river, the mouth - - - -	30	2,429	1,176	46	35	0		-			-		do.
Willow river, the mouth - - - -	65	2,494	-	46	40	30	6	13	30	93	22	30	do.
Sandy Lake river, the mouth - - -	32	2,526	1,253	46	47	10	6	12	38	93	9	30	do.
Swan river, the mouth - - - -	38	2,564	1,290	47	0	43	6	12	36	93	9	0	do.
Kabikons, or Little Falls, the head of the falls -	63	2,627	1,340	47	14	50	6	13	47	93	26	45	do.
Wanomon river, or Vermillion river, the mouth -	21	2,648	-	47	11	4	6	14	10	93	32	30	do.
Eagle Nest savannah, (*Marais aux Nids d'Aigle* of the French) - - - - -	16	2,664	-	47	18	10	6	14	36	93	39	0	do.
Leech Lake river, the mouth - - -	11	2,675	1,356	47	14	0	6	14	52	93	43	0	do.
Lake Cass, the old trading-house on a tongue of land near the entrance of the Mississippi -	80	2,755	1,402	47	25	23	6	18	16	94	34	0	do.
Pemidji lake, or Lake Travers, the entrance of the Mississippi - - - - -	45	2,800	1,456	47	28	46	6	19	22	94	50	30	do.
Itasca lake, Schoolcraft's island - - -	90	2,890	1,575	47	13	35	6	20	8	95	2	0	do.
Utmost sources of the Mississippi, at the summit of the Hauteurs de Terre, or Dividing-ridge, between the Mississippi and Red river of the North - - - - - -	6	2,896	1,680										

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Region of the sources of the Mississippi.

Places of observation.	Altitudes above the Gulf of Mexico.	North latitudes.	West of Greenwich.		Authorities, &c.
			Longitudes in time.	Longitudes in arc.	
	Feet.		*h. m. s.*		
Gayashk river, or Little Gull river, the mouth	1,131	46° 18′ 50″	6 17 44	94° 26′ 0″	Nicollet.
Gayashk lake, or Little Gull lake, end of Long point	1,158	46 24 28	6 17 30	94 22 30	Do.
Kadicomeg lake, or White Fish lake, the entrance of Pine river	1,192	46 40 25	6 16 10	94 2 30	Do.
Lake Chanché, southwest end	-	46 46 35	-	-	Do.
Lake Eccleston, northwest end	-	46 57 0	-	-	Do.
Leech lake, Otter Tail point	1,380	47 11 40	6 17 20	94 20 0	Do.
Leech lake, the bay opposite Otter Tail point	-	47 7 22	6 17 28	94 22 0	Do.
Kabekonang river, the junction of the upper fork, near the next-mentioned portage	1,406	47 16 0	-	-	Do.
Portage from Kabekonang river to La Place river, near the west end	1,540	47 15 0	-	-	Do.
Assawa lake, below the south end	1,532	47 13 10	6 19 40	94 55 0	Do.
Highest ridge on the portage between Assawa lake and Itasca lake	1,695	-	-	-	Do.
Cleared pine camp, on Leech Lake river	-	47 18 0	6 16 0	94 0 0	Do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Northwest region of Lake Superior.

Places of observation.	North latitudes.	West of Greenwich.		Authorities, &c.
		Longitudes in time.	Longitudes in arc.	
		h. *m.* *s.*		
Fort William	48° 23′ 28″	5 57 19.27	89° 19′ 49″	Sir J. Franklin and James Ferguson.
Grand portage, east end	47 57 38	5 59 18.33	89 49 35	James Ferguson.
Grand portage, west end, (Fort Charlotte)	47 58 34	5 59 58.07	89 59 31	Do.
Grouse portage, or *Portage aux Outardes*, east end	47 59 2	-	-	Do.
Portage to Arrow river, east end	48 5 7	-	-	Do.
Portage of Height of Land, west end	48 5 48	-	-	Do.
Island of Height of Land	48 6 21	6 2 50.87	90 42 43	Do.
Island in the strait	48 12 58	-	-	Do.
Island at the entrance of Saganaga	48 13 23	-	-	Do.
Marked rock, near the southeast end of the strait	48 11 32	-	-	Do.
Island in Lac La Croix	48 16 11	6 8 16.27	92 4 4	Do.
Island in Lac La Croix	48 20 43	6 9 16	92 19 0	Do.
Rainy Lake river, Hudson Bay Company's fort	48 36 18	6 33 54.20	98 28 33	Sir J. Franklin.
Mouth of Rainy Lake river, or *rivière Lac à la Pluie* of the French	48 53 16	6 19 3.07	94 45 46	James Ferguson.
Point in Namekom lake	48 26 44	-	-	Do.
Portage du Rat, outlet of Lake of the Woods	49 47 49	6 17 47.27	94 26 49	Do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Southwest region of Lake Superior.

Places of observation.	Altitudes above the Gulf of Mexico.	North latitudes.	West of Greenwich.		Authorities, &c.
			Longitudes in time.	Longitudes in arc.	
	Feet.		*h.* *m.* *s.*		
Madeleine island, the trading-house and level of the lake, (depth of Lake Superior, according to the British Admiralty survey, 792 feet) - - - - - - - - -	620	46° 47′ 10″	6 3 34	90° 53′ 30″	Nicollet.
St. Louis river, the trading-house called *Fond du Lac*, but about 24 miles up stream from the true *Fond du Lac* - - -	–	46 39 50	6 9 1.33	92 15 20	Do.
Culmination of the grand portage, on St. Louis river - -	1,066	–	–	–	Do.
Upper end of the grand portage, on St. Louis river - -	984	–	–	–	Do.
Head of the Long rapids, on St. Louis river - - -	–	46 49 42	6 9 40	92 25 0	Do.
East Savannah river, the mouth - - - - -	1,264	–	–	–	Do.
Dividing-ridge between East and West Savannah rivers - -	1,334	–	–	–	Do.
Portage between Wissakude, or Burnt Wood river, and the head of St. Croix river, emptying into the Mississippi - -	956	–	–	–	Do.
Porcupine hills, (Wisconsin mountain,) 330 yards above the lake -	1,610	–	–	–	British Admiralty survey.
Head of the Kettle rapids, or Akkik rapids, on St. Croix river -	–	45 54 40	–	–	Nicollet.
Falls of St. Croix river - - - - - - -	–	45 20 10	6 10 40	92 40 0	Do.
Kittle-kittigan lake, or *Lac Vieux Desert*, south island - -	–	46 7 31	5 57 20.87	89 20 13	Capt. T. J. Cram.
Kawasidjiwong river, (Montreal river,) the mouth - -	–	46 33 0.5	6 2 58	90 44 30	Do.
the head - -	–	46 18 38	6 1 38.53	90 24 38	Do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

St. Peter's, or Mini-sotah river.

Places of observation.	Estimated distances by water.		Altitudes above the Gulf of Mexico.*	North latitudes.			West of Greenwich.						Authorities, &c.
	From place to place.	From the mouth of St. Peter's river.					Longitudes in time.			Longitudes in arc.			
	Miles.	*Miles.*	*Feet.*				*h.*	*m.*	*s.*				
Mouth of St. Peter's river, Indian agency near Fort Snelling - - - - - -	-	-	744	44°	52′	46″	6	12	19.6	93°	4′	54″	Nicollet.
Nine-Mile creek, the mouth, nine miles by land from Fort Snelling - - - - - -	13	13	-	44	45	50		-			-		Do.
Shakopey Village creek, or Six Village cr'k, the mouth	15	28	-	44	46	15		-			-		Do.
Round Prairie, opposite the beginning - -	30	58	-	44	39	5	6	14	46	93	41	30	Do.
Tchan-kinte river, or *Bois Francs* river, the mouth -	7	65	-	44	36	30	6	15	2	93	45	30	Do.
Witakantu river, or High Island river, the mouth -	13	78	-	44	35	0	6	15	27	93	51	45	Do.
Wan-yo-cha-oju river, or Rush river, or *rivière à la Prêle* of the French, the mouth - - -	18	96	-	44	29	30	6	15	29	93	52	15	Do.
Oeynwajah, (Traverse des Sioux,) the trading-house	20	116	793	44	21	15	6	15	52	93	58	0	Do.
Ridge 2 miles northward of the Traverse des Sioux	-	-	1,011		-			-			-		Do.
Station on the left bank of St. Peter's river, eight miles southwest of the Traverse des Sioux -	-	-	-	44	17	22		-			-		Do.
Mankato river, or Blue Earth river, the mouth -	32	148	-	44	9	6		-			-		Do.
Marrah-tanka lake, south end, on the north side of St. Peter's river - - - - - -	-	-	-	44	12	40	6	17	7	94	16	45	Do.
Waraju river, or *rivière aux Liards* of the French, the mouth - - - - - -	42	190	811	44	16	20	6	17	38	94	24	30	Do.
Mouth of the lost channel, between Chapah and Red Wood rivers - - - - -	68	258	-	44	34	40	6	20	6	95	1	30	Do.
Patterson rapids - - - - -	-	-	-	44	39	50		-			-		Do.

* The numbers in this column refer to the surface of the water in the St. Peter's, at or near the point indicated, except when otherwise specially expressed.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Places of observation.	Estimated distances by water.		Altitudes above the Gulf of Mexico.	North latitudes.	West of Greenwich.		Authorities, &c.
	From place to place.	From the mouth of St. Peter's river.			Longitudes in time.	Longitudes in arc.	
	Miles.	*Miles.*	*Feet.*		*h. m. s.*		
Pepitaxizi river, or Yellow Medicine river, and Chetambey river, (*Eau de Vie* river,) between the two mouths - - - - - -	34	293	-	44° 46′ 4″	6 21 48	95° 27′ 0″	Nicollet.
Falls of St. Peter, amidst the rapids - - -	-	-	-	44 50 0	-	-	Do.
Man-yah-wakan river, (Chippeway river,) the mouth	32	324	-	44 57 40	6 23 0	95 45 0	Do.
Iyedan lake, or *Lac-qui-parle* of the French, Renville's trading-house - - - - - -	26	350	946	45 1 34	6 23 38.2	95 54 33	Do.
Tipsinah river, or *rivière Pommes de Terre* of the French - - - - - - -	18	368	-	45 10 21	6 24 16	96 4 0	Do.
Manka-re-oze river, the first south fork, one mile from the mouth - - - - - - -	12	380	-	45 11 37	6 25 4	96 16 0	Do.
Izuzah river, *rivière aux Grès* of the French, the mouth	5	385	-	45 16 40	6 25 30	96 22 30	Do.
Inijan-tanka, or Big Stone lake, the south creek below the bend of the lake - - - - - -	28	413	966	45 23 0	-	-	Do.
Station between Tokaniway lake and Brochet lake, head of Coteau des Prairies - - - - -	40	453	1,866	45 37 21	6 28 44	97 11 0	Do.
Station of 17th August, 1839, on a lake at the head of Coteau des Prairies - - - - - -	8	461	-	45 41 0	-	-	Do.
Sources of St. Peter's river, Aug. 16, 1839, level of lake	9	470	1,896	45 47 58	6 29 18	97 19 30	Do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Saint Peter's, or Mini-sotah river, and adjacent region.

Places of observation.	Altitudes above the Gulf of Mexico.	North latitudes.	West of Greenwich.		Authorities, &c.
			Longitudes in time.	Longitudes in arc.	
	Feet.		*h. m. s.*		
Ridge dividing the headwaters of St. Peter's and Tchan-kasndata, or Sioux river, at the head of the Coteau des Prairies	2,046	-	-	-	Nicollet.
Station at the fork of Chetambey river	-	44° 51′ 5″	-	-	Do.
Lac aux Jones, Little Rock river	-	44 27 40	-	-	Do.
Mini-sotah lake, (*Lac à l'Eau Claire* of the French)	-	44 26 43	-	-	Do.
Mouth of *rivière Le Sueur*, on Mankato or Blue Earth river	-	44 6 30	-	-	Do.
Blue-earth locality, on the left bank of Mankato river	-	44 6 26	6 16 36	94° 9′ 0″	Do.
Station on the left bank of Mankato river, between the Watonwan river and Blue-earth locality	-	44 3 52	6 16 44	94 11 0	Do.
Mouth of Watonwan river, on the left bank of Mankato river	-	44 1 0	6 16 44	94 11 0	Do.
Man-yah Kichaksey, or Cut cliff, or *l'Ecore Coupée* of the French	-	43 57 50	6 16 40	94 10 0	Do.
Station on the left bank of Mankato river, between Man-yah and Repah Kichaksey	-	43 54 49	-	-	Do.
Hauska lake, or Long lake, eastern end	-	44 4 45	6 18 12	94 33 0	Do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Route from the mouth of the Waraju river to the central part of the Coteau des Prairies

Places of observation.	Altitudes above the Gulf of Mexico.	North latitudes.	West of Greenwich.		Authorities, &c.
			Longitudes in time.	Longitudes in arc.	
	Feet.		*h. m. s.*		
Waraju river, the month	811	44° 16′ 20″	6 17 38	94° 24′ 30″	Nicollet.
First encampment on the left bank of the Waraju, June 20, 1838	1,064	44 18 14	6 18 33	94 38 0	do.
Second encampment on the left bank of the Waraju, June 21, 1838	1,160	44 14 29	6 19 55	94 58 45	do.
Third encampment on the left bank of the Waraju, June 22, 1838	1,190	44 13 14	6 21 12	95 18 0	do.
Walnut Oasis, or *l'Ile aux Noyers* of the French	1,360	–	–	–	do.
Lake Shetek, or Rabechy lake of the Sioux	1,578	44 8 34	6 22 42	95 40 30	do.
Sources of the Moingonan (*Des Moines*) river, second lake of north fork	–	44 3 0	6 24 6	96 1 30	do.
Red Pipestone Quarry, near the Chimney	–	44 0 53	6 25 17.7	96 19 26	do.
Coteau des Prairies Percé, southwest end, near Lake Benton	–	44 14 0	6 25 29	96 23 15	do.
Encampment on Tchan-kasndata river	–	44 20 20	6 27 41	96 55 15	do.
Ti-tanka-he lake	–	44 26 0	6 28 4	97 1 0	do.
Lake Poinsett	–	44 37 20	6 28 16	97 4 0	do.
Mouth of Redwood creek, on Tchan-kasndata river	–	44 41 12	6 28 7	97 1 45	do.
Tisaptonan lakes, (*Lacs des Deux Bois* of the French,) south end	–	44 56 0	6 27 23	96 50 45	do.
Hills at the head of the first fork of Izuzah river, near Punished Woman lake	–	45 3 20	6 27 26	96 51 30	do.
Hill at the head of the third fork of Izuzah river, near Watapapi lake	1,910	45 15 24	6 27 50	96 57 30	do.
Fourth fork of Izuzah river, the junction in the Low Prairie	978	45 22 36	6 27 7	96 46 45	do.
Fork of Impah river, the junction	–	44 55 50	6 24 20	96 5 0	do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Route from the St. Peter's to Spirit Lake, through the southern part of the Coteau des Prairies.

Places of observation.	Altitudes above the Gulf of Mexico.	North latitudes.			West of Greenwich.						Authorities, &c.
					Longitudes in time.			Longitudes in arc.			
	Feet.				*h.*	*m.*	*s.*				
Vermillion river, the crossing-place	-	44°	41′	41″	6	11	58	92°	59′	30″	Nicollet.
La Hontan river, the crossing-place	-	44	30	38	6	11	51	92	57	45	do.
Hills traversed by the party after leaving La Hontan river	974		-			-			-		do.
Isuzah lake	1,186	44	19	27	6	12	22	93	5	30	do.
Bois Francs hills, bordering La Hontan river	1,238		-			-			-		do.
Main south fork of La Hontan river, the crossing-place	-	44	17	50	6	12	40	93	10	0	do.
Ti-tanka-tanninan lake, the east shore	884	44	16	41	6	13	23.5	93	20	52.5	do.
Sakatah lake, near the head of La Hontan river	932	44	18	50	6	13	57	93	29	15	do.
Hills bordering Sakatah and Okaman lakes	1,075		-			-			-		do.
Crossing-place on Tchan-kasna river	-	44	6	20	6	14	35	93	38	45	do.
Crossing-place on Tewapadan river	-	43	57	45	6	15	17	93	49	15	do.
Crossing-place on Tewapah-tankiyan river	-	43	55	30	6	15	54	93	58	30	do.
Crossing-place on Mankato river, (low-water level)	1,114	43	52	10	6	16	28	94	7	0	do.
Prairie land on both sides of Mankato river	1,179		-			-			-		do.
Repah-Kichaksey Hill, on the left bank of Mankato river	1,284		-			-			-		do.
Crossing-place on Tchan-jushka river	-	43	47	0	6	17	28	94	22	0	do.
Omanhu lake, east end	-	43	40	50	6	18	30	94	37	30	do.
Crossing-place on the Moingonan river	-	43	33	30	6	19	38	94	54	30	do.
Spirit lake, about the middle of the northern shore	1,310	43	30	21	6	20	26	95	6	30	do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Return route from Spirit Lake to the St. Peter's, through the Coteau des Prairies.

Places of observation.	Altitudes above the Gulf of Mexico.	North latitudes.	West of Greenwich.		Authorities, &c.
			Longitudes in time.	Longitudes in arc.	
	Feet.		*h. m. s.*		
Dividing-ridge, on the Coteau des Prairies, between Spirit lake and Moingonan river	1,414	–	–	–	Nicollet.
Crossing-place on the Moingonan river	–	43° 29′ 20″	6 19 20	94° 50′ 0″	do.
Okamanpidan lake, south shore	1,304	43 29 17	6 18 14	94 33 30	do.
Tchan-hassan lakes (*Lacs Malés* of the French,) north shore	–	43 30 44	6 17 42	94 25 30	do.
Crossing-place on Iya-hende river, or River of the Lakes	–	43 33 0	6 17 20	94 20 0	do.
Crossing-place on the Mankato river	–	43 39 33	6 16 14	94 3 30	do.
Tewapah-tankiyan lake, northeast angle	–	43 52 33	6 15 44	93 56 0	do.
Crossing-place on Psah river	–	43 58 25	6 15 0	93 45 0	do.
Crossing-place on Tchankasna river	–	44 1 0	6 14 16	93 34 0	do.
Lake Geyer, northwest angle	–	44 3 40	6 14 0	93 30 0	do.
Lake Scammon	–	44 12 44	6 14 6	93 31 30	do.
Mouth of the Racoon fork, on the Moingonan (*Des Moines*) river	–	41 34 44	6 14 28.5	93 37 7.5	do.
Station on the right bank of the Moingonan river, below Racoon fork	–	41 28 21	6 12 54	93 13 30	do.
Station on the right bank of the Moingonan river, opposite Vessoi's trading-house	–	41 8 24	6 10 36.1	93 39 1.5	do.
Station on the left bank of the Moingonan river, at Phelps's trading-house	–	40 59 1	6 9 35	92 23 45	do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Missouri river at low water.

Places of observation.	Estimated distances by water.		Altitudes above the Gulf of Mexico.	North latitudes.	West of Greenwich.		Authorities, &c.
	From place to place.	From the Gulf of Mexico.			Longitudes in time.	Longitudes in arc.	
	Miles.	*Miles.*	*Feet.*		*h. m. s.*		
Mouth of Missouri river, the south bank, 18 miles above St. Louis	18	1,408	388	38° 50′ 50″	6 0 55	90° 13′ 45″	Nicollet.
Goebel's residence, near Newport, Franklin county, Missouri	-	-	-	38 33 58	6 4 28.6	91 7 9	D. W. Goebel.
Gasconade river, the mouth	105	1,513	-	38 41 40	-	-	Lewis and Clarke.
Portland, Callaway county, Missouri, left bank of Missouri river	10	1,523	-	38 42 57	6 6 41	91 40 15	Nicollet,
Osage river, the mouth	20	1,543	-	38 35 0	-	-	Lewis and Clarke.
Nashville, Boone county, left bank	36	1,579	-	38 47 7	6 11 18	92 49 30	Nicollet.
Boonville, Cooper county, right bank	25	1,604	530	38 57 18	6 10 46	92 41 30	do.
Hill on the right bank at Boonville	-	-	602	-	-	-	do.
Grand river, southwest of the mouth	66	1,670	-	39 19 0	-	-	do.
Old Fort Osage, right bank	78	1,748	-	39 9 33	-	-	Major Long's first expedition.
Lower Liberty landing	22	1,770	-	39 11 43	6 17 21	94 20 15	Nicollet.
Kansas river, the mouth	20	1,790	-	39 5 25	-	-	Lewis and Clarke.
Fort Leavenworth, the landing-place	30	1,820	746	39 22 40	6 18 56	94 44 0	Nicollet.
Cow island	9	1,829	-	39 25 5	-	-	Major Long's first expedition.
Sand-bar, 18 miles above Fort Leavenworth—above the Old Cut-off	9	1,838	-	39 29 42	6 20 4	95 1 0	Nicollet.
Black Snake hill, the landing	38	1,876	797	39 44 23	6 19 10	94 47 30	do.
Top of Black Snake hill	-	-	912	-	-	-	do.
Antelope island	48	1,924	-	40 4 23	6 21 18	95 19 30	do.
Nishnabatona river, opposite the mouth	24	1,948	-	40 16 50	6 21 40	95 25 0	do.
Bald island, lower end, and western side	29	1,977	-	40 34 0	6 22 18	95 34 30	do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Places of observation.	Estimated distances by water.		Altitudes above the Gulf of Mexico.	North latitudes.	West of Greenwich.		Authorities, &c.
	From place to place.	From the Gulf of Mexico.			Longitudes in time.	Longitudes in arc.	
	Miles.	*Miles.*	*Feet.*		*h* m. s.		
Five-Barrel islands - - -	31	2,008	972	40° 49′ 44″	6 22 48	95° 42′ 0″	Nicollet.
Hill on the right bank at Five-Barrel islands	-	-	1,152	-	-	-	do.
Platte river, north side of the mouth - -	18	2,026	-	41 3 24	-	-	Major Long's first expedition.
Engineer Cantonment - - - - -	-	-	-	41 25 4	6 22 55.5	95 43 52.5	Maj. J. D. Graham.
Island three miles below Council Bluffs by water	55	2,081	1,023	41 28 20	6 23 2	95 45 30	Nicollet.
First hills on the right bank between Engineer Cantonment and Council Bluffs -	-	-	1,127	-	-	-	do.
Second hills, behind first hills -	-	-	1,327	-	-	-	do.
Inyan-yanke river, (Little Sioux river,) three miles below the mouth - - -	78	2,159	-	41 47 0	6 23 36	95 54 0	do.
Wood's Hills, old trading-house - -	38	2,197	-	42 0 49	6 24 28	96 7 0	do.
Floyd's Grave, top of the river bank - -	66	2,263	1,253	-	-	-	do.
Huppan-kutey Prairie, left bank, one mile above American Fur Company's trading-house -	65	2,328	1,217	42 44 25	6 26 47.4	96 41 51	do.
Hills on the right bank, two miles below the preceding station - - - -	-	-	1,540	-	-	-	do.
Ponkah river, one mile below the mouth, left bank of Missouri river - - - -	98	2,426	-	42 50 0	-	-	do.
Nawizi river, near the mouth - - -	5	2,431	-	42 51 40	-	-	do.
Wicha-pahah, or Scalp Mountain creek, two miles above the mouth - - - -	45	2,476	-	43 8 33	6 34 28	98 37 0	do.
Rantesha-wita, or Red Cedar island, lower end, opposite Bad creek - - - -	14	2,490	1,296	43 14 24	6 35 11	98 47 45	do.
Hills on the right bank of Red Cedar island—							
First range - - -	-	-	1,523	-	-	-	do.
Second range - - -	-	-	1,876	-	-	-	do.
Third range - - -	-	-	2,033	-	-	-	do.

Sailor island, one mile below - - -	36	2,526	1,314	43	38	4	6	36	32	99	8	0	do.
Hills on the left bank between Sailor island and White river, viz:													
Top of the Black Zone (pseudo volcano)	-	-	1,532		-			-			-		do.
Top of the upland, or Biyou's hills -	-	-	1,738		-			-			-		do.
Mankizita, or White river, the mouth - -	11	2,537	-	43	41	0	6	36	48	99	12	0	do.
Lower island, or beginning of the Great Bend -	45	2,5[illegible]2	-	44	9	0	6	37	20	99	20	0	do.
Dry Wood river, one mile below the entrance -	34	2,616	-	44	7	31	6	38	6	99	31	30	do.
Fort Pierre Chouteau, on the right bank -	48	2,664	1,456	44	23	28	6	40	50	100	12	30	do.
Hills about Fort Pierre, west side, at one to two miles distance, about - -	-	-	1,596		-			-			-		do.
Highest point, northeast, two miles from Fort Pierre, on the opposite bank -	-	-	1,960		-			-			-		do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Route from Fort Pierre Chouteau to Mini-wakan lake, through the basins of Tchan-san-san and Shayen-oju rivers.

Places of observation.	Altitudes above the Gulf of Mexico.	North latitudes.	West of Greenwich.		Authorities, &c.
			Longitudes in time.	Longitudes in arc.	
	Feet.		*h. m. s.*		
Western slope of the Coteau of Missouri, six miles from the top, encampment July 6, 1839	2,096	44° 51′ 11″	6 36 18.4	99° 4′ 36″	Nicollet.
Encampment July 8, 1839, on Wamdushka, or Snake river	1,696	45 4 6	6 34 46	98 41 30	do.
Tchan-rarah-chedan lake	-	45 10 18	6 33 56	98 29 0	do.
Otuhu-oju, or Oakwood settlement, or *Talle de Chênes* of the French, on Tchan-san-san river, at the old trading-house	1,341	45 16 34	6 32 31	98 7 45	do.
Pey river, or Elm river, or *rivière aux Ormes* of the French, near the mouth	-	45 36 2	6 32 18	98 4 30	do.
Encampment, July 16, 1839, on Tchan-san-san river, (*rivière Jacques* of the French)	-	45 58 26	6 31 36	97 54 0	do.
Encampment, July 17, 1839, on Tchan-san-san river, at two forks	-	46 9 0	6 31 25	97 51 15	do.
Crossing-place on Tchan-san-san river, near *Butte aux Os*	1,400	46 27 37	6 32 32	98 8 0	do.
Plateau dividing the waters of Tchan-san-san and Shayen-oju rivers	1,458	-	-	-	do.
Tampah creek, or Birch creek, three miles above its entrance into Shayen-oju river	-	46 41 57	6 31 17	97 49 15	do.
Mouth of first Bald Hillocks river, (*rivière aux Buttes Pelées* of the French)	-	47 8 47	6 31 14	94 48 30	do.
Butte Michaud, or Michaud Hillock, 120 feet above the level of the prairie	1,586	-	-	-	do.
Lake Jessie, (*Lac des Bois* of the French,) the high point	-	47 32 32	6 32 7	98 1 45	do.
Crossing-place on the Shayen-oju, mouth of Beaver Lodge river, level of the plateau	1,486	47 46 29	6 32 54	98 13 30	do.
Water level of the Shayen-oju river	1,328	-	-	-	do.
Mini-wakan, or Devil's lake—first station, on southwest shore	-	47 55 58	6 34 21	98 35 15	do.
second station, on south shore	1,476	47 59 29	6 33 52	98 28 0	do.
third station, at the southeast end	-	47 54 39	6 33 32	98 23 0	do.
Mini-wakan Chantey Hill, or the Heart of Devil's lake	1,766	-	-	-	do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Route from Mini-wakan to the head of the Coteau des Prairies.

Places of observation.	Altitudes above the Gulf of Mexico.	North latitudes.	West of Greenwich.		Authorities, &c.
			Longitudes in time.	Longitudes in arc.	
	Feet.		*h. m. s.*		
Wamdushka lake, (*Lac des Chicots* of the French,) northwest end -	-	47° 49′ 38″	6 33 54	98° 13′ 30″	Nicollet.
Crossing-place of a creek emptying into Shayen-oju river, left bank -	-	47 46 30	-	-	do.
Plateau dividing the waters of the Shayen-oju river from those of the Red river of the North—route August 8, 1839 - - -	1,507	-	-	-	do.
Eastern end of the plateau, having an extended view of the basin of the Red river of the North - - - - - -	1,372	-	-	-	do.
Encampment August 8, 1839, on the north fork, at the head of Grouse river, or *rivière aux Outardes* - - - - - - -	1,186	47 41 2	6 29 53	97 28 15	do.
At noon, August 9, 1839, on the middle fork, at the head of Grouse river -	-	47 35 0	-	-	do.
Encampment August 9, 1839, on the south fork, at the head of Grouse river	-	47 26 26	6 29 58	97 29 30	do.
Encampment August 10, 1839, on the north fork, at the head of Elm river	-	47 13 10	6 29 58	97 29 30	do.
Group of small lakes and swamps at the head of Elm river - -	1,102	-	-	-	do.
Crossing-place on the Shayen-oju river, Aug. 14, 1839—level of the plateau	1,438	46 34 10	6 30 20	97 35 0	do.
Water level of the Shayen-oju river - - - - -	1,228	-	-	-	do.
General level of plateau between the Shayen-oju and Dead Colt hillock	1,302	-	-	-	do.
Top of Dead Colt hillock, or *Butte du Poulain Mort* of the French -	1,372	46 16 30	6 30 15	97 33 45	do.
Four Hillock lake, or *Lac des Quatre Buttes* of the French - -	1,320	46 1 11	6 29 27	97 21 45	do.
Top of the Four Hillocks - - - - - - -	1,372	-	-	-	do.
Ascent of the Coteau des Prairies from Four Hillock lake, viz:					
First barometric station, 90 feet above the lake - - -	1,410	-	-	-	do.
Second do. 130 do. first station - -	1,540	-	-	-	do.
Third do. 310 do. second station -	1,850	-	-	-	do.
Fourth do. (top) 150 do. third station - -	2,000	-	-	-	do.
680					
Dividing-ridge between the St. Peter's and Tchan-kasndata rivers -	2,046	-	-	-	do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Places of observation.	Altitudes above the Gulf of Mexico.	North latitudes.	West of Greenwich.		Authorities, &c.
			Longitudes in time.	Longitudes in arc.	
	Feet.		*h. m. s.*		
Cold Spring lake, on Tchan-kasndata river, or Sioux river - -	1,686	45° 29′ 46″	6 28 50	97° 12′ 30″	Nicollet.
Plateau bordering Tchan-kasndata river, at Cold Spring lake - -	1,836	-	-	-	do.
Watapapi lake - - - - -	1,854	-	-	-	do.
Top of the eastern slope of the Coteau des Prairies, at third fork of Izuzah river - - - - -	1,854	-	-	-	do.
Intervening hillocks or *buttes* between the last two stations - -	1,916	-	-	-	do.
Descent of the Coteau des Prairies from the top of the eastern slope opposite Big Stone lake, viz:					
First barometric station, 408 feet - - - - -	1,446	-	-	-	do.
Second do. 365 " - - - - -	1,081	-	-	-	do.
Third do. 117 " - - - - -	964	-	-	-	do.
Total descent to Big Stone lake - 890 "					
Encampment August 23, 1839, on two lakes, northeast of Big Stone lake -	1,070	45 18 40	6 25 20	96 20 0	do.
Lake Travers, near the old trading-house - - - - - -	-	45 39 52	6 26 32	96 38 0	Long's second expedition.
Red fork of the Red river of the North, near the junction - - -	-	47 47 25	-	-	Long's second expedition.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Sundry positions in the south part of the State of Missouri.

Places of observation.	Altitudes above the Gulf of Mexico.	North latitudes.	Authorities, &c.
	Feet.		
Ridge, 2½ miles north from St. Genevieve, on the road to St. Louis - - - - - - -	604	-	Nicollet.
Top of the mountain *Fourche Hypolite*, at the crossing-place of the road from St. Genevieve to St. Louis -	850	-	Do.
Ridge beginning at *Fourche Michaud*, and running north of Côte Ronde - - - - - -	687	-	Do.
Top of mountain called Côte Ronde, on the left bank of *rivière à la Vase* - - - - - -	732	-	Do.
Ridge between Côte Ronde and Hertick's settlement, on the left side of Little Saline river - - - -	488	-	Do.
Highest hill of the plateau upon which New Bourbon stands, near St. Genevieve - - - - -	641	-	Do.
St. Mary's College, Perry county, level of the pavement - - - - - - - -	626	37° 43′ 57″	Do.
Fredericktown, Madison county, level of the pavement of the Catholic church - - - - -	756	37 34 24	Do.
Primary hills, at the narrows of the east branch of St. Francis river, in Madison county - - -	1,046	-	Do.
Dividing-ridge between the waters that empty themselves into the Current, Big Black, St. Francis, and Maramek rivers, on the road from Fredericktown to Old Mine village - - - - - -	1,100	-	Do.
Old Mine village, Washington county, level of the pavement of the Catholic church - - - - -	828	38 0 57	Do.
Fourche Renaud mountain, five miles west of Old Mine village - - - - - - -	986	-	Do.
Top of the pit of Vallé's lead-mine, St. Francis county - - - - - - - - -	1,196	-	Do.
Ridge called Jackson hill, at the culmination of the road from Old Mine village, through Little Canada, to St. Genevieve - - - - - - - - - - - - - -	912	-	Do.

APPENDIX A.—TABLE OF GEOGRAPHICAL POSITIONS—Continued.

Sundry positions in the State of Arkansas.

Places of observation.	Altitudes above the Gulf of Mexico.	North latitudes.	Authorities, &c.
	Feet.		
Little Rock city, new State-house and general level - - - - - - - -	339	34° 45′ 24″	Nicollet.
Big Rock, on the left bank of Arkansas river, three miles above Little Rock - - - - -	680	-	Do.
Petit-jean mountain, right bank of Arkansas river - - - - - - - -	700	-	Do.
McLean's landing, Crawford county, right bank and water-level of Arkansas river - - - - -	366	-	Do.
Magnetic Cove mountain, on the new road from Little Rock to Hot Springs - - - - - -	800	-	Do.
Ferry-place on the Saline river, at Lockhart's, Saline county - - - - - - - -	242	-	Do.
Hot Springs - - - - - - - - - - - - - - - - - -	718	-	Do.
Ridge lying on the south side of Hot Springs:			
Lower part, overhanging Hot Springs - - - - - - - - - - - -	997	-	Do.
Highest summit of ridge, five or six miles back of Hot Springs - - - - - - -	1,406	-	Do.
Ridge on the northeast side of Hot Springs, highest part - - - - - - - - - -	1,169	-	Do.

APPENDIX B.

Catalogue of plants collected by Mr. Charles Geyer, under the direction of Mr. I. N. Nicollet, during his exploration of the region between the Mississippi and Missouri rivers: By Professor JOHN TORREY, *M. D.*

The country over which this collection of plants has been made is described by Mr. Nicollet, in the report that accompanies his map. It lies between the Mississippi and Missouri rivers, embracing two extensive tracts:—

1. The Coteau des Prairies, and the Mississippi and the Missouri valleys; consisting of prairies throughout, interspersed with woods and lakes, and the soil of which is alternately sandy, gravelly, or clayey, in the character of an erratic deposite. Its elevation above the sea is from 1,000 to 2,000 feet, and it extends from the 39th to beyond the 48th degree of north latitude.

2. The extensive basin of the *rivière Jacques*, or Tchan-san-san river of the Sioux, and the prolongation of the Coteau des Prairies, north of the Shayen-oju that empties into the Red river of the North. The basin of the *rivière Jacques* is a vast prairie, situated between the Coteau des Prairies and the Coteau du Missouri, and is from sixty to eighty miles west of the former. It is sparingly wooded, and its level above the sea is from 1,200 to 1,400 feet, or nearly 600 feet lower than the two Coteaux between which it lies. The northeastern portion is a region of salinas, including the great salt lake called Mini-wakan, or Devil's lake, together with all the headwaters of the rivers that empty into the Red river of the North, on its west side. The soil is sandy in every part, and the timber is found only along the water-courses and borders of the lakes.

It is well to remark, that there are two Shayen rivers—one emptying into the Red river of the North, and properly named *Shayen-oju;* the other pouring its waters into the Missouri a little below the 45th degree, and is called by the French, without any adjunct, *Shayèn* river. It is the Washtey, or Good river of the Sioux. But, in reference to the *habitats* of the plants mentioned in the catalogue, they have been principally collected within the region of the former river.

As an additional remark, it may be stated that what, in Mr. Geyer's notes, are designated as "slate-hills," "naked, arid, and argillaceous hills," of the Upper Missouri, are more properly reported by Mr. Nicollet as belonging to the cretaceous formation, and consist principally of calcareous marl and plastic clays.

Finally, although this collection is not sufficiently extensive, owing to the loss of a large portion of it between the rapids of the Des Moines and St. Louis, to justify any general views of the distribution of the principal families of plants in the region explored by Mr. Nicollet, its catalogue will, nevertheless, I trust, be a valuable contribution to the geographical distribution of American plants, as well as for the number of new species it adds to our Flora.

CLASS I.—EXOGENOUS, OR DYCOTYLEDONOUS PLANTS.

RANUNCULACEÆ.

Anemone patens, (Linn.) Prairies near Devil's lake; May and June.

Anemone Caroliniana, (Walt.) Council Bluffs; May 13.

Anemone Pennsylvanica, (Linn.) Alluvial prairies of Missouri; May 2.

Ranunculus aquatilis, var. *capillaceus*, (Torr. and Gr.) Near Devil's lake; July 22.

Ranunculus cymbalaria, (Pursh.) Saline margins of Devil's lake; July 31.

Ranunculus sceleratus, (Linn.) With the preceding.

Ranunculus repens, (Linn.) Dry, barren hills around St. Louis; April 19.
var. *Marilandicus*, (Torr. and Gr.) Wet places, St. Louis.

Ranunculus abortivus, (Linn.) Shady woods, Missouri, and near Devil's lake; April 18.

Isopyrum biternatum, (Torr. and Gr., Fl. Am. Suppl.) Rocky woods, banks of the Missouri; April 15.

Aquilegia Canadensis, (Linn.) Fertile woods, Council Bluffs; May 18.

Delphinium azureum, (β Torr. and Gr.) Dry hills, Upper Missouri; April 18.

Actæa rubra, (Bigel.) Woods, Devil's lake; August 1.

Thalictrum dioicum, (Linn.) Mouth of Little Platte river; April 18.

ANONACEÆ.

Uvaria triloba, (Torr. and Gr.) Mouth of Platte river; April 18.

MENISPERMACEÆ.

Menispermum Canadense, (Linn.) Woods, Mankato river; September 25—*fruit.*

BERBERIDACEÆ.

Leontice thalictroides, (Linn.) Woods near Council Bluffs, and mouth of St. Peter's river; April 25.

NYMPHÆACEÆ.

Nymphæa advena, (Ait.) Upper waters of the Grouse river of North Red river; August 10.

PAPAVERACEÆ.

Sanguinaria Canadensis, (Linn.) Fertile woods, Kansas river; May 5.

FUMARIACEÆ.

Corydalis aurea, (Willd.) Woods near St. Louis; April 18.

Dielytra cucullaria, (D. C.) Near Gasconade river, Missouri; April 9.

CRUCIFERÆ.

Nasturtium sinuatum, (Nutt.) Missouri river, sand-bars; April 28—*not in fruit.*

Nasturtium palustre, (D. C.) Margin of swamps near Jacques river; July 9.

Arabis Canadensis, (Linn.) Shady woods, Upper Missouri; April 29.

Arabis dentata, (Torr. and Gr.) Shady ravine near Council Bluffs; April 30.

Arabis lævigata, (D. C.) Woods opposite St. Louis; April 19.

Cardamine Ludoviciana, (Hook.) Margin of swamps, St. Louis, &c.; April 19.

Dentaria laciniata, (Muhl.) Rocky banks of the Missouri; April 4.

Sisymbrium canescens, (Nutt.) St. Louis and Fort Pierre, Upper Missouri; April and June.

Erysimum asperum, (D. C.) Hills, Upper Missouri and Devil's lake; June and July.

Erysimum cheiranthoides, (Linn.) Banks of rivers, Upper Mississippi; August.

Stanleya pinnatifida, (Nutt.) Slaty hills near L'Eau-qui-court river; May 23.

Draba Caroliniana, (Walt.) St. Louis and Council Bluffs; April 30.

Draba brachycarpa, (Nutt.) Grassy hills about St. Louis; April 16.

Lepidium ruderale, (Linn.) Fort Pierre, Missouri valley; June 9.

Capsella Bursa-pastoris, (Moench.) Upper Missouri; June 14.

CAPPARIDACEÆ.

Cleome integrifolia, (Pursh.) Naked banks of rivers, Upper Missouri; July 9.

Polanisia graveolens, (Raf.) Gravelly hills and sandy banks of the Upper Missouri; June 19.

POLYGALACEÆ.

Polygala Senega, (Linn.) Borders of ponds, Upper Missouri.

Polygala verticillata, (Linn.) Prairies about Devil's lake; August 1.

Polygala alba, (Nutt.)—*P. Beyrichii*, (Torr. and Gr.) Roots thick, throwing up numerous stems, which are 6 to 8 inches high; leaves scarcely a line wide; spike somewhat larger than those of *polygala verticillata;* lobes of the *caruncle* half as long as the hairy seed. Gravelly banks of the Missouri, near the banks of L'Eau-qui-court river; May 23. A rare species, of which I for the first time saw specimens in this collection.

VIOLACEÆ.

Viola delphini folia, (Nutt.) Prairies near Council Bluffs; May 5.

Viola Canadensis, (Linn.) Prairie groves, from near the mouth of Vermillion river, Upper Missouri, north to Devil's lake; May 10.

Viola cucullata, (Ait.) Prairies near Council Bluffs; May 15.

Viola Nuttallii, (Pursh.) Valley of the Missouri, above White river; June 14.

Viola pubescens, var. *scabriuscula*, (Torr. and Gr.) Woods near Council Bluffs; April 17.

DROSERACEÆ.

Parnassia palustris, (Linn.) Boggy meadows, Devil's lake, and valley of Shayen river; July 30.

CISTACEÆ.

Hudsonia tomentosa, (Nutt.) Castle rock, near Cannon or La Hontan river, and Upper Mississippi; October 12—*fr.*

HYPERICACEÆ.

Hypericum pyramidatum, (Ait.) Borders of woods and prairies, St. Peter's river; September 17—*fr.*

Hypericum ellipticum, (Hook.) Dry swamps near Devil's lake; July 24.

CARYOPHYLLACEÆ.

Arenaria lateriflora, (Linn.) Dry woods, Devil's lake; July 26.

Stellaria longipes, (Gold.)—(*Meringiæ species*, Fenzl.) Var. *petalis calyce sesqui longioribus, profundi bipartitis; sepalis ovato-lanceolatis; obscuri 3-nervis.* Springs about Devil's lake; July 26.

ILLECEBRACEÆ.

Spergula rubra, (Torr. and Gr.) Low saline soils between Jacques and Red rivers.

PORTULACACEÆ.

Claytonia Virginica, (Linn.) Woods, Upper Missouri; April 6.

LINACEÆ.

Linum perenne, (Linn.) Prairies between Shayen-oju river and Devil's lake; July 20.

Linum rigidum, (Pursh.) Missouri hills and alluvions; June 12.

GERANIACEÆ.

Geranium Carolinianum, (Linn.) Dry prairies, Upper Missouri; June 8.

Geranium maculatum, (Linn.) Fertile woods, Council Bluffs; April 30.

OXALIDACEÆ.

Oxalis violacea, (Linn.) Moist prairies, Council Bluffs; April 29.

Oxalis stricta, (Linn.) Dry banks, Upper Missouri; April 29.

ZANTHOXYLACEÆ.

Zanthoxylum Americanum, (Mill.) Fertile woods of the Missouri, opposite the old Kansas village; April 17.

ANACARDIACEÆ.

Rhus trilobata, (Nutt.) Hills of Missouri, near L'Eau-qui-court river; June 8—*fr.*

MALVACEÆ.

Sida coccinea, (D. C.) Dry hills of the Missouri, south of Devil's lake; May 19.

VITACEÆ.

Vitis riparia, (Michx.) Throughout the prairie region between the Missouri and Mississippi rivers; May 17.

ACERACEÆ.

Acer dasycarpum, (Ehrh.) Upper Missouri; June—*fr.*
Negundo aceroides, (Moench.) With the preceding; April—*fl.*

CELASTRACEÆ.

Celastrus scandens, (Linn.) Ravines near Council Bluffs; May 19—*fr.*
Staphylea trifolia, (Linn.) Woods, Upper Missouri; April 13.
Euonymus atropurpureus. Woods, Spirit lake; common; September 30—*fr.*

RHAMNACEÆ.

Rhamnus lanceolatus, (Pursh.) Ravines near Council Bluffs; May 19.
Ceanothus ovalis, (Bigel.) Council Bluffs; May 15.

LEGUMINOSÆ.

Vicia Americana, (Muhl.) Woody margins of Shayen river; the most abundant vetch in the rocky prairies of St. Peter's; July 24.
Lathyrus palustris, (Linn.) Buffalo prairie, near Council Bluffs—*sine fl.*
Lathyrus ornatus, (Nutt.) Grassy banks of the Upper Missouri; rare; June 1—*fr.*
Lathyrus linearis, (Nutt.) Prairie near Council Bluffs; May 16.
Lathyrus venosus, (Muhl.) Rocky prairies, Lower St. Peter's; common; July 24—*fr.*
Phaseolus leiospermus, (Torr. and Gr.) Common on the rivers and banks of lakes through the prairie region between the Mississippi and Missouri rivers; July 7—*fr.*
Glycyrrhiza lepidota, (Nutt.) Prairies of James river, (Jacques;) July 15.
Psoralea esculenta, (Pursh.)—(*P. brachiata*, Hook.) *Pomme de prairie* and *pomme blanche.* Prairies from Council Bluffs north; May 17.
Psoralea argophylla, (Pursh.) High prairies in the whole region between the Missouri and Mississippi rivers; July 5

Psoralea cuspidata, (Pursh.)—(*P. cryptocarpa*, Torr. and Gr.; *vide* Fl. N. Am., Suppl., p. 668.) Naked hills of the Missouri, near White river; July 5.

Psoralea lanceolata, (Pursh.) Sand-bars of the Upper Missouri—*sine fl.*

Amorpha fruticosa, (Linn.) With the preceding; May 22.

Amorpha canescens, (Nutt.) Prairie region between the Missouri and Mississippi; abundant; July 16.

Amorpha nana, (Nutt.) Hills of Missouri, near White river; June 18.

Petalostemum candidum, (Michx.) High prairies of the Missouri and Mississippi; July 13.

Petalostemum violaceum, (Michx.) Prairies, sources of the St. Peter's; August 25.

Dalea alopecuroides, (Willd.) Banks of Spirit lake, &c.; October 1—*fr.*

Hosackia Purshiana, (Benth.) Naked hills of the Upper Missouri; June 16.

Astragalus Hypoglottis, (Linn.) High prairies and river alluvions, Upper Missouri; June 16.

Astragalus caryocarpus, (Ker.) Leaflets manifestly petiolulate, narrowed at the base; peduncles about the length of the leaves; raceme 6–10 flowered; calyx hirsute, with blackish hairs; teeth one-third the length of the tube; corolla bright violet purple, three-fourths of an inch long; legume immature. Black Snake hills, Upper Missouri, Lower St. Peter's river, and high prairies between the Missouri and Mississippi; April 17.

Astragalus racemosus, (Pursh.) Dry, argillaceous hills, Upper Missouri; May 24.

Astragalus gracilis, (Nutt.) Canescently pubescent; stem slender, branched; leaflets 5—6 pairs, distant, narrowly linear, obtuse, petiolulate; stipules linear-lanceolate, with a broad base; peduncles 2—3 times as long as the leaves; racemes spicate; flowers (white, tinged with blue) erectopatulous, numerous; legumes (very small) ovate, sessile, inflated, depressed, abruptly acumenate; calyx semi-ovate, hirsute; tube twice the length of the acute teeth; roots long and slender, with the taste of liquorice; stems 1½ foot high, moderately branched; leaflets three-fourths of an inch long, and less than one line wide, distinctly petiolulate; racemes 30—40 flowered; pedicles somewhat recurved in fruit; flowers one-fourth of an inch long. Missouri hills, near the mouth of Vermillion and L'Eau-qui-court rivers; May 24.

Astragalus spicatus, (Nutt.?) Canescently hirsute, with appressed hairs; stem much branched; leaves on short petioles; leaflets 8—9 pairs, often alternate, elliptical, obovate, nearly glabrous above; stipules minute, lanceolate; raceme 10—15 flowered, about as long as the leaves; flowers spreading; calyx cylindrical-oblong, very gibbous at the base; teeth one-third the length of the tube, very obtuse; legume (immature) oblong-cylindrical, somewhat curved. Naked hills of the Upper Missouri, and the adjoining prairies; May 22.

Oxytropis splendens, (Dougl.) Fertile, elevated prairies between Shayenoju and Red rivers, &c.; July 25.

Oxytropis Lamberti, (Pursh.) Densely silky pubescent; stems nearly subterranean; leaves with very long petioles; leaflets 9—11 pairs, lanceolate and elliptical-lanceolate, acute, pubescent on both sides; stipules lanceolate, adnate to the petiole; peduncles ½—⅓ longer than the leaves; racemes oblong, 15–18 flowered; flowers (large, bright purple) erect, spreading; calyx tubular; teeth subulate, one-third the length of the tube; vexillum about as long as the wings; legumes coriaceous, triangular, concave on the dorsal suture, abruptly acuminate, glabrous; the sutures thickened. Hills near Council Bluffs, on the Upper St. Peter's, &c.; May 17.

Phæa elongata, (Hook. ?) Leaves linear-cuneiform; calyx villous; legume one inch long, curved; upper suture thickened; legumes 3—4 lines long, 2 lines broad, about six-seeded, canescently hirsute, transversely veined, concave on the back, the ventral suture tumid. This species (which I doubtfully refer to *P. elongata* of Hooker) appears to be distinct from any other *Phaea* described in the Flora of North America. It is allied to *P. pectinata*, (Hook.,) but differs in its articulated leaflets, larger flowers, &c.

Phæa cæspitosa, (Nutt.) High prairies near Devil's lake—*sine fl.*

Homalobus multiflorus, (Torr. and Gr.) Naked hills of Missouri and Shayen rivers; July 24—*fl.* and *fr.* Stems numerous, 1½ foot high; legume 5—6 seeded.

Desmodium Canadense, (D. C.) Borders of rivers and woods, St. Peter's river, &c.; August 3.

Lupinus pusillus, (Nutt.) About the habitations of the *prairie marmot*, near White river, Upper Missouri; June 6—*fl.* and *fr.*

Schrankia uncinata, (Willd.) Hills on the Missouri; June 30.

Darlingtonia brachyloba, var. *glandulosa*, (Torr. and Gr.) Gravelly banks of Spirit lake; September 30—*fl.* and *fr.*

Cercis Canadensis, (Linn.) Woods, Missouri; common; April 4.

ROSACEÆ.

Cerasus Virginiana, (D. C.) Banks of the Missouri; April 25.

Cerasus pumila, (Michx.) Arid hills of the Upper Missouri; June 19.

Potentilla argentea, (Linn.) Prairie swamps, Shayen-oju river, &c.; July 15.

Potentilla arguta, (Pursh.) Fertile prairies near Wamdushka and Shayen-oju rivers; July 18.

Potentilla paradoxa, (Nutt.) Margin of Devil's lake; July 26. The large appendage to the base of the seed is of a spongy texture, and contains no starch. I found it in all the specimens of this collection, but fear, nevertheless, the identity of this species and *P. supina.*

Potentilla Pennsylvanica, var. *bipinnatifida*, (Torr. and Gr.) No label with the specimens.

Fragaria Virginiana, (Mill.) Hills of the Upper Missouri; June 19.

Chamærhodos erecta, (Bunge.) Dry hills about Devil's lake; July 29—*fl.* and *fr.*

Geum strictum, (Ait.) Borders of woods, Devil's lake; July 24.

Rosa blanda, (Ait. ?) Perhaps *R. stricta.* Stem with reddish prickles. Leaflets 7—9; the under surface and the petioles pubescent. Devil's lake; August 1.

Rosa lucida, (Ehrh.) Banks of the Upper Missouri; May 25.

Cratægus coccineus, (var. Torr. and Gr.) Banks of the Upper Missouri; April 25.

Amelanchier Canadensis, var. *oblongifolia*, (Torr. and Gr.) Banks of the Upper Missouri and its tributaries; May 10, *fl.*; July 4, *fr.*

ONAGRACEÆ.

Epilobium coloratum, (Muhl.) Saline margins of Devil's lake; August 1.

Epilobium palustre, β *albiflorum*, (Lehm.) Wet woods, Devil's lake; July 30.

Epilobium angustifolium, (Linn.) With the preceding; August 1.

Gaura coccinea, (Nutt.) Council Bluffs, and high prairies between the Missouri and Mississippi; May 16.

Œnothera serrulata, (Nutt.) With the preceding; July 6.

Œnothera cæspitosa, (Nutt.) Slate hills, Upper Missouri; June 10.

Œnothera albicaulis, (Nutt.) Sandy places; sources of the St. Peter's, &c.; June 9.

Œnothera pinnatifida, (Nutt.) Sandy soils; valley of the Missouri and White rivers; June 6.

Œnothera biennis, (Linn.) Upper Missouri and Mississippi; July 16.

Circæa lutetiana, (Linn.) Fertile woods, Devil's lake; August 2.

Myriophyllum spicatum, (Linn.) Near Shayen-oju river; July 25.

Hippuris vulgaris, (Linn.) Jacques River lake, &c.; July 15.

LOASEÆ.

Menzelia ornata, (Torr. and Gr.) Argillaceous hills, Upper Missouri, with *Yucca angustifolia* and *Stanleya*; June—no *fl*.

GROSSULARIACEÆ.

Ribes Missouriense, (Nutt.) Rocky woods on the Missouri and Mississippi rivers; April 15. Branches grayish white; racemes 3—5 flowered; peduncles and pedicles pubescent; leaves pubescent, especially on the under surface.

Ribes lacustre, (Poir.) With the preceding.

Ribes floridum, (l'Herit.) Woods, Mississippi and Missouri; May 16.

Ribes aureum, (Pursh.) Banks and ravines near L'Eau-qui-court, or Niobrarah river; May 23—*fr*.

SAXIFRAGACEÆ.

Hydrangea arborescens, (Linn.) *Fr.*, (no label.)

UMBELLIFERÆ.

Zizia aurea, (Koch.) Prairies, Council Bluffs; May 22—*fl*.

Sium lineare, (Michx.) Prairie swamps, Devil's lake; August 3.

Thaspium barbinode, (Nutt.) Fertile woods, Upper Missouri. Plant 3½ feet high; leaflets 2½ inches long; the petioles and veins more or less pubescent when young.

Peucedanum fœniculaceum, (Nutt.) Fertile elevated prairies. Council Bluffs, May 22—*fr*.

Polytænia Nuttallii, (D. C.) Dry argillaceous hills, Upper Missouri; June 3—*fr. jun.*

Osmorhiza longistylis, (D. C.) Woods, Council Bluffs; April 18—*fr*.

Osmorhiza brevistylis, (D. C.) With the preceding.

ARALIACEÆ.

Aralianudicaulis, (Linn.) Fertile woods, Devil's lake; August 1—*fr*.

CORNACEÆ.

Cornus stolonifera, (Michx.) Low woods and islands, Upper Missouri, abundant; June 2—*fl.* and *fr. jun.*

Cornus Florida, (Linn.) Missouri bluffs, as high as the Kansas river; April 14.

RUBIACEÆ.

Syraphoricarpus occidentalis, (R. Br.) Banks of Shayen-oju river, July 14. The most common shrub in the prairie region. Leaves of the young shoots often coarsely toothed, as in *S. rasemosa.*

Galium aparine, (Linn.) Low woods of the Missouri, May 28. Leaves in the young plant mostly 7 in a whirl.

Galium trifidum, (Linn.) Dry swamps, Devil's lake; August 3—*fr.*

Galium boreale, (Linn.) With the preceding; July 20.

COMPOSITÆ.

Vernonia fasciculata, (Michx.) Dry swamps, Devil's lake; August 2.

Liatris punctata, var. β and γ, (Hook.) Dry prairies on the dividing-ridges between the Mississippi and Missouri waters; August 20.

Liatris scariosa, (Willd.) Mouth of the St. Peter's river; September 19.

Kuhnia eupatoriodes, var. *corymbosa*, (Torr. and Gr.) High prairies, Devil's lake; July 27.

Eupatorium perfoliatum, (Linn.) Sioux country; September 22.

Eupatorium purpureum, (Linn.) Wet meadows, Devil's lake; August 2.

Eupatorium ageratoides, (Linn.) Borders of woods, Upper Missouri; September 30.

Aster Novæ Angliæ, (Ait.) Border of swamps, Upper Missouri and tributaries; September 10.

Aster cardifolius, (Linn.) Woody hills, St. Peter's river; September 6.

Aster angustus, (Torr. and Gr.) Saline swampy margin of Lake of the Woods; July 25.

Aster Novæ Belgii, (Linn.) and var. *minor*, (Torr. and Gr.) Borders of Spirit lake; October 1.

Aster sagittifolius, (β. Torr. and Gr.) Woods, St. Peter's river; September 6.

Aster sericeus, (Vent.) Dry hills from the St. Peter's river across to the Missouri; August 31.

Aster azureus, (Lindl.) Prairies of Mankato river; September 20.

Aster lævis, (Linn.) Upper Missouri; September 25.

Aster oblongifolius, (Nutt.) High prairies and limestone hills, Upper Mississippi; September 16.

Aster ptarmicoides, (Torr. and Gr.) Hills, &c., between the Missouri and Mississippi rivers; August and September.

Erigeron pumilum, (Nutt.) Hills of the Missouri, near Fort Pierre; June 26.

Erigeron strigosum, (Muhl.) Borders of swamps, Devil's lake; July 26.

Erigeron Philadelphicum, (Linn.) Missouri alluvions; April 30.

Erigeron Canadense, (Linn.) Banks of Mankato river; September 16.

Erigeron divaricutum, (Michx.) Upper Missouri; a weed about the habitations of the prairie marmot; July 4.

Erigeron glabellum, (Nutt.) Fertile prairies, Devil's lake, &c.; July 26.

Solidago latifolia, (Linn.) Shady banks, Upper Mississippi; September 11.

Solidago erecta, var. *stricta*, (Torr. and Gr.) Prairie region between the Missouri and Mississippi; September 14.

Solidago Riddellii, (Frank.) Boggy prairies, near St. Peter's river; September 14.

Solidago nemoralis, (Ait.) Fertile prairies, Devil's lake; July 22.

Solidago Missourensis, (Nutt.) High prairies towards the sources of the St. Peter's; August 14.

Solidago Canadensis, (β Torr. and Gr.) Throughout the more northern prairies of Upper Missouri; July and August.

Solidago gigantea, var. *Pitcheri*, (Torr. and Gr.) August 22.

Solidago incana, (Torr. and Gr.) Prairie region between the Missouri and Mississippi rivers, growing in tufts; July 7.

Boltonia glastifolia, (l'Her.) Devil's lake, and mouth of St. Peter's river; August.

Gutierrizia euthamiæ, (Torr. and Gr.) Arid soil, Upper Missouri, &c.; July 20.

Aplopappus spinulosus, (D. C.) High prairies, Upper Missouri to Upper St. Peter's; July 8.

Grindelia squarrosa, (Dunal.) Prairies, Jacques to Shayen-oju rivers, east to the Coteau des Prairies, Upper St. Peter's.

Chrysopsis villosa, (Nutt.) Sandy arid soil, Upper Missouri; June 28.

Silphium laciniatum, (Linn.) Wet prairies, Lower St. Peter's river, Upper Des Moines river, &c.; September 26.

Iva axillaris, (Pursh.) Arid hills, Upper Missouri; May 25.

Ambrosia coronopifolia, (Torr. and Gr.) Saline margin of Devil's lake; August 1.

Ambrosia trifida, (Linn.) Borders of woods, Devil's lake; July 26.

Xanthium echinatum, (β Torr. and Gr.) Banks of Spirit lake, and head-waters of Little Sioux river; September 30—*ripe fr.*

Echinacea angustifolia, (β Torr. and Gr.) Dry, gravelly ridges of Upper Missouri; June 28.

Rudbeckia hirta, (Linn.) Moist ravines near Devil's lake; August 3.

Lepachis columnaris, (Torr. and Gr.) and var. *pulcherrime*, (Torr. and Gr.) Dry prairies about James (Jacques) river, Upper St. Peter's, &c.; July 6.

Helianthus petiolaris, (Nutt.) Argillaceous hills, Upper Missouri; June 4.

Helianthus grosse-serratus, (Martens.) Moist prairies, St. Peter's river; September 8.

Helianthus lenticularis, (β Torr. and Gr.) With *H. petiolaris*.

Helianthus pumilus, var. *Nicolleti*, (Torr. and Gr.) Prairies, Devil's lake, August 1.

Helianthus rigidus, (D. C.) With the preceding, and at Devil's lake.

Helianthus ———, (perhaps a new species.) Borders of rivulets on St. Peter's river.

Coreopsis (Calliopsis) tinctoria, (Nutt.) Prairies about Jacques river; July 6.

Dysodia chrysanthemoides, (Lag.) Marmot habitations near Fort Pierre; rare on the Upper Missouri; June 10.

Gaillardia aristata, (Pursh.) Highest arid prairie ridges between James (Jacques) river and Devil's lake; July 16.

Hymenophyllus tenuifolius, (Pursh.) Gravelly banks of the Missouri, above L'Eau-qui-court river; May 20.

Helenium autumnale, *β grandiflorum*, (Torr. and Gr.) Mouth of the St. Peter's river; September 2.

Achillea millefolium, *γ occidentale*, (D. C.) Grassy ravines of the Missouri hills; June 14.

Antennaria plantaginea, (R. Br.) Dry hills, Upper Missouri; May 5.

Antennaria dioica, (R. Br.) With the preceding; June 11—*fr.*

Senecio balsamitæ, (Willd.) Dry hills near Council Bluffs; May 16.

Senecio aureus, (Linn.) Prairies, Council Bluffs; abundant; May 16.

Senecio integerrimus, (Nutt.) Grassy ravines, Upper Missouri; May 27. Very smooth, and somewhat glaucous; about two feet high; achenia angularly sulcate.

Senecio (undetermined.) Saline margin of Devil's lake; July 31. No. 96, Geyer.

Artemisia longifolia, (Nutt.) Arid calcareous marl-hills near the mouth of Washtey, or Titon river, Upper Missouri.

Artemisia dracunloides, (Pursh.) Sandy prairies, lakes and river banks, between the Missouri and Mississippi rivers; common; July.

Artemisia cana, (Pursh.) Arid hills and valleys of the Missouri and Shayen oju rivers, &c.; June 14.

Artemisia biennis, (Nutt.) Arid banks of Spirit lake, &c.; September 30.

Artemisia dracunculoides, var.? *canescens*, (Torr. and Gr.) Sandy banks and prairies of Jacques river—*s. fl. and fr.*

Artemisia frigida, (Willd.) Shady prairies, Jacques river, &c.; July 18.

Artemisia Canadensis, (Linn.) With the preceding, and at Devil's lake—*s. fl. and fr.*

Cirsium discolor, (Spreng.) Banks of Snake river; July 8.

Cirsium, (new species?) Fertile prairies around Devil's lake; August 5.

Cirsium undulatum, (Spreng.) Missouri hills, near Fort Pierre; June 14.

Cirsium, (new species?) With the preceding.

Sonchus pulchellus, (Pursh.)—*Lactuca pulchella*, (D. C.) *L. integrifolia*, (Nutt, gen.) Biennial stem, 1—2 feet high; leaves nearly all runcinate; upper (and sometimes most of the cauline ones) nearly or quite entire; heads 10—15, in a more or less fastigiate panicle; pedicle about as long as the flower; involucre glabrous, purplish; inner scales about 8; achenia deeply sulcate, glabrous, attenuate upwards into a short beak; pappus silky, white, consisting of numerous soft hairs in a single series. Banks of lakes and rivers, Upper Missouri; July 15.

Lactuca, (new species?)—not in Herbarium—(Torr. and Gr.) Arid banks of a lake formed by Jacques river; July 15.

Nabalus albus, var. *serpentaria*, (Torr. and Gr.) Banks of Devil's lake; July 31.

var. *suavis*, (Torr.) *N. suavis*, (D. C.) *N. albus*, (Hook.) Leaves very variable in this species.

Nabalus racemosus, (D. C.) Prairies, Devil's lake; August 2. Stem often simple; stem-leaves oblong, acute or obtuse, clasping; lowest ones attenuate at the base; undulate-toothed.

Nabalus Illinoensis, (D. C.) Coteau des Prairies, Upper Sioux, or Tchankasndata river; August 16. Stem 1½ to 2½ feet high; lower part sometimes nearly glabrous; leaves erosely denticulate, 1—3 inches long; heads 11—12, flowered.

Lygodesmia juncea, (Nutt.) Hills of Missouri, near Fort Pierre, &c. June 25.

Hieracium runcinatum (?), (Jacques.) Borders of woods, Devil's lake August.

Troximon glaucum, (Nutt.) Grassy, damp ravines, Coteau des Prairies August 16.

Troximon marginatum, (Nutt.) Fertile hills and valleys, Upper Missouri; May 8.

ERICACEÆ.

Arctostaphylos uva ursi, (Spreng.) Sandstone rocks, Upper Missouri.

Vaccinium tenellum, (Ait.) With the preceding.

LOBELIACEÆ.

Lobelia spicata, (Lam.)—*L. Claytoniana*, (Michx.) Ravines and low grounds, Jacques river; July 13.

Lobelia Kalmii, (Linn.) About springs, Devil's lake; July 31.

CAMPANULACEÆ.

Campanula rotundifolia, (Linn.) Ravines in the prairies of Shayen-oju river; July 20.

OLEACEÆ.

Fraxinus acuminata, (Lam. ?)—*F. Americana*, (Michx. *f.*) Upper Missouri. Leaflets 7, ovate-oblong, acuminate, serrate; under surface and the petiole pubescent; calyx minute; fruit linear, spathulate obtuse, emarginate.

Forestiera acuminata, (Poir.)—(Nutt. in Amer. Philos. Trans., 5, p. 176. *Adelia acuminata*, (Michx. *fl.*, Bor. Amer., 2, p. 225, t. 48.) Banks of Kahokia river, opposite St. Louis. This genus is, by some botanists, referred to *euphorbiaceæ;* but it seems to be much more nearly related to *oleaceæ.* Michx. (l. c.) remarks: "*genus affin Chion antho.*"

Forestiera sambucifolia, (Willd.) With the preceding.

APOCYNACEÆ.

Apocynum cannabinum, (Linn.) Banks of Tampah river, *rivière au Bouleaux* of the Shayen-oju; July 17.

ASCLEPIADACEÆ.

Asclepias verticillata, (Linn.) Prairies of Devil's lake; July 27. Var *β*, stems short, (about a span high,) numerous, very slender. In the prairies near Fort Pierre, Upper Missouri; July 4.

Asclepias macranthera, (Torr. in Ann. Lyc., New York, 2, p. 218.)—*A. Douglassii*, (Hook., Fl. Bor. Amer. 2, p. 53, t. 142.) The figure and description of Hooker (l. c.) agree minutely with Nicollet's specimens, and also with the *A. macranthera* collected by James, in Long's expedition.

Acerates viridi flora, (Ell.) Hills of the Missouri; June 29.

GENTIANACEÆ.

Gentiana detonsa, (Fries.) Boggy prairies about Devil's lake; July 30. Corolla, deep azure blue.

Gentiana puberula, (Michx.) Northern part of the elevated grassy plain between the Missouri and the Mississippi; August to October.

Gentiana propinqua, (Rich.) Fertile prairies between Shayen-oju and Red rivers; July 20.

Gentiana affinis, (Griseb.) Fertile prairies, Devil's lake; August 6.

Gentiana quinqueflora, (Lam.) Northern part of the prairie region; September and October.

Gentiana crinita, (Froel.) Moist prairies, St. Peter's river; September 20.

Gentiana saponaria, (Linn.) Hills and prairies, La Hontan river; September 27.

Gentiana Andrewsii, (Griseb.) Wet prairies, Upper Mississippi; September 15. I am suspicious that this species is not sufficiently distinct from the *G. saponaria*.

POLEMONIACEÆ.

Phlox divaricata, (Linn.) Banks of the Missouri, to the Platte; April 8.

Collomia linearis, (Nutt.) Upper Missouri; June 13—*fr.*

Navaretia (Gilia) *intertexta*, (Hook.) Dry swamps in the prairies east of Devil's lake; August 8.

CONVOLVULACEÆ.

Convolvulus stans, (Michx.) Grassy ravines, Jacques river; June 8.

Evolvulus argenteus, (Pursh., Nutt.) Gravelly hills of the Missouri, near Fort Pierre; June 28.

BORAGINACEÆ.

Heliotropium curassavicum, (Linn.) Stony, wet borders of Jacques river; July 16.

Lithospermum incisum, (Lehm.—Hook., Fl. Bor. Amer., 2, p. 87, t. 165.) *L. longiflora*, (Spreng.) &c. High prairies near Council Bluffs; April 30.

Lithospermum canescens, (Lehm.) Dry prairies, Black Snake hills; April 17.

Lithospermum Mandanense, (Hook., Fl. Bor. Amer., 2, p. 88 and 166.) Upper Missouri. Root thick, black, perennial; stem and leaves canescently pubescent, (the pubescence appressed;) leaves 1½ inch long, lanceolate-linear; flowers solitary; axillary in the upper part of the stem; calyx of 5 linear segments as long or longer than the tubular (yellowish) corolla; border of the corolla slightly spreading; (?) lobes roundish, one-third the length of the tube; crenate eroded; nuts turgidly ovale, with a few impressed dots towards the base; stames as long as the tube of the corolla.

Myosotis chorisiana, (Cham.—Hook., 2, p. 83.) Dry swamps in the prairies about Devil's lake; August 1.

Myosotis glomerata, (Nutt.—Hook., Fl. Bor. Amer., 2, p. 82, t. 162.) Dry situations, Upper Missouri, near Fort Pierre; June 25.

Echinospermum patulum, (Lehm.) Prairies near Fort Pierre; June 12.
Echinospermum Lappula, (Lehm.) With the preceding.
Onosmodium hispidum, (Michx.) Prairies near Titon, or Shicha river; rare; June 14.

HYDROPHYLLACEÆ.

Hydrophyllum Virginicum, (Linn.) Fertile woods near Council Bluffs; April 30.
Ellisia nyctagenea, (Linn.) About the prairie marmots' habitations, Upper Missouri; June 24.

LABIATÆ.

Lycopus obtusifolius, (Michx.) *Benth. Lab.*, *p.* 186. Saline margins of Devil's lake; August 2. No traces of steril filaments.
Monarda fistulosa, (Linn.) *Benth.*, *l. c.* Prairies, Devil's lake; July 30.
Hedeoma hirta, (Nutt.) Prairie marmots' habitations, Upper Missouri; June 10—*fr.*
Lophantus anisatus, (Benth.) Borders of woods, Shayen oju river and Devil's lake; July 20.
Physostegia Virginica, (Benth.) With the preceding. A variable plant; leaves in Mr. Nicollet's specimens coarsely and acutely toothed.

SOLANACEÆ.

Solanum nigrum, (Linn.) Sandy banks of Spirit lake; September 20—*fl.* and *fr.*
Solanum triflorum, (Nutt.) A weed about the holes of the prairie marmot, Upper Missouri. It was found in similar situations by Drummond in British North America, from Carlton House to Edmonton House.
Androcera lobata, (Nutt.) *Solanum heterandum*, (Pursh.) Ferruginous steril soils in the Missouri valley, near Fort Pierre; June 20.
Physalis lanceolata, (Michx.?) Dry banks of Jacques river; July 15—*fl.* and *fr.* Root perennial; stem about one foot long, glabrous; leaves petiolate, obovate-lanceolate, obtuse, entire, or undulate on the margin; fructiferous calyx globose; corolla dull yellow, about half an inch in diameter; berry red, about the size of a small cherry; differs from Michaux's description in the perennial root; and from *P. grandiflora* (Hook) in the smooth stem and leaves, as well as smaller flowers.
Physalis viscosa, (Linn.) *W. E. Aikin in Eat. Man.* Sandy banks of Spirit lake; September 29—*fr.*

SCROPHULARIACEÆ.

Pentstemon grandiflorum, (Nutt.) *P. Bradburii*, (Pursh.) Banks of the Upper Missouri; April 27.
Pentstemon cristatum, (Nutt.) *Erianthera*, (Pursh.) Missouri hills, near Fort Pierre; June 13.
Pentstemon erianthum, (Nutt.) Hills of Shayen river; June 19.

Pentstemon albidum, (Nutt.) var. (?) Hills, Hupan-kutey prairie, Upper Missouri, May 17. Stem 6 to 10 inches high; lower leaves lanceolate, acute, entire; upper ones sharply denticulate, glabrous, lanceolate; flowers half an inch in diameter, three-fourths of an inch long; calyx glandularly pubescent; segments ovate-lanceolate, very acute, and somewhat mucronate; corolla violet, tubular, campanulate; segments ovate, nearly equal; pubescent externally; glabrous internally; *steril filament*, with an interrupted glandular pubescence on one side, about half-way down; summit simple.

Pentstemon gracile, (Nutt.) Low situations, in prairies near Fort Pierre; June 19.

Chelone glabra. Swamps in woods; September 2.

Mimulus Geyeri, (Torr.) Annual; every part glabrous, except the peduncles; stem diffuse, creeping; leaves roundish ovate, nearly entire, or obscurely repand-toothed, somewhat cordate; the lower ones abruptly contracted into a short petiole; upper ones sessile; peduncles axillary, solitary, puberulous, scarcely longer than the leaves; calyx ovate, 5 ribbed; teeth short, unequal, (upper one largest;) flowers (small, yellow?) villous on the inferior part of the throat. Fresh water springs, Devil's lake, August 1. I have an imperfect specimen of this species collected by Doctor James in Long's expedition, probably towards the Rocky Mountains. It is allied to *M. alsinoides*, (Dougl.,) but is stouter, the peduncles and petioles much shorter, and the calyx more unequal. *M. floribunda* differs in its strongly dentate leaves, and nearly equal calyx. Lindley also describes the plant as "patentipilosus;" but my specimens from Hooker are quiet glabrous.

Gratiola Virginica, (Linn.) Near St. Louis; roadsides.

Veronica scutellata, (Linn.) Swamps about Devil's lake; August 3.

Veronica peregrina, (Linn.) Swamps, Jacques river; July 6—*fr.*

Monniera rotundifolia, (Michx.) Wet places in the prairies near Jacques river; July 6.

Gerardia purpurea, (Linn.) Prairies near Devil's lake; August 8.

Gerardia tenuifolia, (Vahl.) With the preceding.

Orthocarpus strictus, (Benth.) Prairies from Jacques river, north to Red river; July 6. Probably, as Hooker suggests, only a variety of *O. luteus*, (Nutt.)

Castilleja sessiliflora, (Pursh.) *Euchionia grandiflora*, (Nutt.) Prairies about Council Bluffs; May 5.

Pedicularis lanceolata, (Michx.) Low woods, Devil's lake; August 6.

Pedicularis Canadensis, (Linn.) Black Snake hills, Upper Missouri; April 12.

Orobanche fasciculata, (Nutt.—Hook., Fl. Bor. Amer., 2, p. 93, t. 170.) Arid hills of the Missouri, near the Great Bend; June 6.

VERBENACEÆ.

Verbena urticifolia, (Linn.) Banks of Devil's lake; July 28.

Verbena stricta, (Michx.) Banks of lakes and rivers; prairies of Missouri; July 7.

Verbena bracteosa, (Michx.) Prairies of Upper Missouri; a weed in the marmots' habitations.

PRIMULACEÆ.

Lysimachia ciliata, (Linn.) Borders of woods, Shayen river and Devil's lake; July 20—*fr.*

Lysimachia thyrsiflora, (Linn.) *L. capitata*, (Pursh.) Swamps abou Council Bluffs, &c.; May 16, (*fl.* in expansion.)

Glaux maritima, (Linn.) Saline low places in the prairies betwee Shayen-oju river and Devil's lake; July 14—*fr.*

LENTIBULARIÆ.

Utricularia vulgaris, (Linn.) Ponds near Jacques river; July 6.

PLANTAGINEÆ.

Plantago cripeda, (Torr. in Ann. Lyc. New York, 2, p. 237.) Denuded low places in the prairies near Shayen-oju river and Devil's lake; July 16.

Plantago major, (Linn.) Fertile soils, Shayen-oju river valley; July 20—*fr.*

Plantago Caroliniana, (β. ?) *Pusilla*, (Torr.) *P. pusilla*, (Nutt.) Upper Missouri; June 20.

Plantago aristata, (Michx.) Arid plains of the Upper Missouri, near Fort Pierre; June 6.

Plantago gnaphalioides, (Nutt.) Arid conical hills in the prairies near Devil's lake; July 24.

NYCTAGINEÆ.

Oxybaphus hirsutus, (Hook.) *Allionia hirsuta*, (Pursh.) *A. pilo* (Nutt.?) Arid hills near Fort Pierre; July 26.

Oxypaphus angustifolius, (Torr. in Ann. Lyc. New York, 2, p. 237.) Denuded hills near the mouth of Shayen-oju river, Missouri; June 1

Oxypaphus nyctaginea, (Torr., l. c.) Buffalo prairie, Upper Missour June 14.

AMARANTHACEÆ.

Amaranthus albus, (Linn.) Sandy shore of the Upper Missouri; June 27.

Amaranthus, near *polygoniodes*, (Willd.) With the preceding.

CHENOPODIACEÆ.

Kochia (?) *dentata*, (Nutt.) Hills of Missouri, above Eau-qui-court river; May 13. Only male specimens are in the collection; and Mr. Nuttall found no others. The plant, as its discoverer suspected, is hardly of this genus.

Obione canescens, (Moq.) *Atriplex canescens*, (Nutt.) Sterile, sandy soi in the valley of the Missouri; July 2.

Obione argentea, (Moq.) *Atriplex argentea*, (Nutt.) With the preceding—probably in saline situations, as the specimens have a salt taste; May 25.

Chenopodium album, (Linn.) Banks of Devil's lake; July 26.

Chenopodium hybridum, (Linn.?) Dry woods, valley of Shayen-oju river; July 24.

Chenopodium, (new species ?) A small annual; whole plant hoaryfurfuraceous; leaves linear oblong, attenuated at the base into a short petiole, entire; flowers in glomerate spikes. Conical hills about Devil's lake; August 2.

Atriplex laciniata, (β.) *Americana*, (Torr. Fl. N. W. and N. States.) *A. Purshiana*, (Moq.) Low saline places in the prairies between James (Jacques) river and Devil's lake; July 5.

Salsola (?) *depressa*, (Pursh.) Saline depressed situations between Jacques river and Devil's lake; very abundant; July 5. Moquin Tandon refers Pursh's plant to *sueda prostrata* (Pall;) and Nuttall considers it as identical with *sals. salsa, (suaeda maritima*, Moq.;) but the seed is vertical.

Salicornia herbacea, (Linn.) With the preceding.

POLYGONACEÆ.

Rumex salicifolius, (Weinn.) *Hook. Fl. Bor. Amer.* 2, *p.* 129. *R. pallidus*, (Bigel.) Margin of a saline lake near Jacques river; July 6—*fr.* This is the *R. verticileatus* of our northern botanists; but, according to Hooker, hardly of Linnæus.

Rumex persicarioides, (Linn.) Sandy banks of the Missouri.

Rumex venosus, (Pursh.) *Hook. l. c. t.* 174. Hill-sides, Upper Missouri; June—*fr.*

Rumex Britannicus, (Linn.?) Wet meadows, valley of the Missouri; June 10. The specimens agree well with the European plant, but they want the fruit.

Polygonum articulatum. Sandy plains, Upper Missouri.

Polygonum aviculare, (Linn.) Borders of ponds and lakes in prairies; July 6.

Polygonum amphibium, var. *strigosum*, (Torr.) Sand-bars of the Missouri, near Council Bluffs.

Polygonum Persicaria, (Linn.) Saline borders of Devil's lake; July 30.

LAURACEÆ.

Laurus benzoin, (Linn.) Low woods, banks of the Missouri; April 6.

ELEAGNACEÆ.

Eleagnus argentea, (Pursh.) Between Shayen-oju and Red rivers; abundant about Devil's lake.

Shepherdia argentea, (Nutt.—Hook., l. c., t. 178.) *Hippophäe argentea*, (Pursh.) Upper Missouri and Upper St. Peter's rivers; June 10—*fr.*

SANTALACEÆ.

Comandra umbellata, (Nutt.—Hook, l. c., t. 179, A.) Dry prairies near Council Bluffs; April 29.

EUPHORBIACEÆ.

Euphorbia portulacoides, (Willd.) Hills of the Upper Missouri; June 10
Euphorbia marginata, (Pursh.) Valley of the Missouri and Upper St. Peter's; June 24.
Euphorbia cyathophora, (Willd.) Sandy shore of Spirit lake, St. Peter's river, &c.; September 18.
Euphorbia maculata, (Linn.?) Sandy situations, valley of the Missouri; June 19.
Euphorbia polygonifolia, (Linn.—Hook., l. c.) With the preceding; June 29.

CALLITRICHACEÆ.

Callitriche verna, (Linn.) No label.

URTICACEÆ.

Urtica gracilis, (Ait.) Banks of Spirit lake, &c.; September 30—*fr.*
Urtica Canadensis, (Linn.) Woods, Jacques river; July 10—*fr.*
Parietaria Pennsylvanica, (Muhl.) Prairies, Upper Missouri; June 6.
Morus rubra, (Linn.) Woods of the Missouri, near Council Bluffs; May 5—*fr.*

ULMACEÆ.

Ulmus Americana, (Linn.) Woods of the Missouri, near Platte river; April 20—*fr.*

AMENTACEÆ.

Ostrya Virginica, (Willd.) With the preceding.
Salix longifolia, (Willd.) The commonest sand-bar; willow of the Upper Missouri; May 22.
Salix (undetermined.) One of the less abundant sand-bar willows of the same region; May 22—*fr.*
Salix (undetermined.) With the preceding; not abundant; May 22—*fr.*
Quercus tinctoria, (Bartr.) Prairies near Council Bluffs—*no fr.*
Quercus rubra, (Linn.) Islands, Upper Mississippi—*no fr.*
Quercus macrocarpa, (Michx.?) Prairies of the Upper Missouri—*no fr.* The principal oak of the prairie region.
Quercus montana, (Willd.) Black Snake hills, Upper Missouri—*no fr.*

CONIFERÆ.

Juniperus Virginica, (Linn.) Dry hills and ravines, Big Bend of the Missouri; June 4—*fr.* Hooker considers this plant as identical with *J. sabina* of Europe.

CLASS II.—ENDOGENS, OR MONOCOTYLEDONOUS PLANTS.

IRIDACEÆ.

Sisyrinchium anceps, (Linn.) Moist prairies, Upper Missouri and Devil's lake; July 22—*fr.* *S. mucronatum* is mixed with this plant; but it seems to differ only in the longer mucronate opatha.

ORCHIDACEÆ.

Peristylus bracteatus, (Lindl.) *Habenaria bracteata*, (R. Br.) Prairie groves near Council Bluffs; April 18.

Spiranthes cernua, (Rich.) Boggy, elevated prairies of the Upper St. Peter's; August 20.

Spiranthes cernua, var. *latifolia*, (Torr.) Hills of Embarras river, Upper Mississippi; September.

Cypripedium pubescens, (Willd.) Prairies, Upper Missouri; May 20.

Cypripedium candidum, (Muhl.) Prairie copses, Upper Missouri; May 30. Whole plant only 6—10 inches high.

MELANTHACEÆ.

Ammianthium Nuttallii, (Gray.) Arid, argillaceous hills of the Washtey, or Shayen river, Missouri; June 19—*fr.*

Zigadenus glaucus, (Nutt.) Grassy ravines and low places in prairies, Shayen-oju river, and Upper St. Peter's; July 17.

LILIACEÆ.

Convallaria stellata, (Linn.) Woody ravines, Upper Missouri; April 29.

Uvularia grandiflora, (Sm.) Fertile woods, banks of the Missouri; May 7.

Allium stellatum, (Gawl., Bot. Mag.) Moist situations in the prairies of the Upper St. Peter's; August 2.

Allium angulosum, (Pursh.) Hills, Upper Missouri; May 19.

Erythronium albidum, (Nutt.) Rocky woods, Upper Missouri; April 6.

TRILLIACEÆ.

Trillium sessile, (Willd.) Rocky woods, Upper Missouri; April 30.

SMILACEÆ.

Smilax herbacea, (Linn.) *S. lasioneuron*, (Hook., Fl. Bor. Amer., 2, p. 173, t. 187, A.) Low, fertile woods, Council Bluffs; May 4. Only staminate plants are in the collection.

Smilax rotundifolia, (Linn.?)—"Horse-briar." On the Missouri; common; May 18. This differs from the ordinary *S. rotundifolia* of the Northern States, in the longer and more slender prickles, terate branches, &c. The latter has quadrangular branches, and is, doubtless, *S. quadrangularis*.—(Willd.)

JUNCAGINACEÆ.

Triglochin maritimum, (Linn) Saline, sandy places in the prairies about Shayen-oju river and Devil's lake; July 17—*fl.* and *fr.*

PLUVIALES.

Potamogeton natans, (Linn.) Ponds, Upper Missouri; July 20—*fr.*
Potamogeton pectinatus, (Linn.) Ponds near Jacques river; July 8.
Potamogeton gramineus, (Linn.?) With the preceding. Specimens imperfect.

ARACEÆ.

Arum triphyllum, (Linn.) Fertile woods, Upper Missouri; April 28.
Sparganium ramosum, (Linn.) Near Jacques river; July 6—*fr.*

JUNCACEÆ.

Juncus bufonius, (Linn.) Muddy banks of Jacques river; July 18.
Juncus tenuis, (Willd.)—(small var.) Devil's lake; August 6—*fr.*
Juncus polycephalus, (Michx.) With the preceding.
Juncus acuminatus, (Michx.) With the preceding.

COMMELINACEÆ.

Tradescantia Virginica, (Linn.) Sandy, fertile places in the valley of the Missouri; June 16.

ALISMACEÆ.

Alisma Geyeri, (new species.) Stemless; leaves elliptical-lanceolate, very acute, attenuate at the base; flowers hexandrous. Muddy margins of ponds near Devil's lake; August 6—*fl.* and *fr.* Plant about six inches high; leaves five-nerved; lamina 3—4 inches in length, longer than the petiole; scapes, several from one root, assurgent, shorter than the leaves; the branches verticillate; pedicles umbellate at the summit of the branches; flowers hermaphrodite, as large as in *A. plantago;* sepals ovate, obtuse, concave, greenish in the middle, scarious on the margin; petals roundish, white; stamens, 6; anthers roundish; ovaries, about 15, disposed in a circle, not costate, with a very short beak. Allied to *A. tenellum*, (Mart.;) but that species differs in its linear-lanceolate leaves, enneandrous flowers, and costate fruit.

CYPERACEÆ.

Cyperus Schweinitzii, (Torr.) Sandy plains near Devil's lake, and prairies of the Lower St. Peter's river; July 28.
Dulichium spathaceum, (Pers.) Swamps in the Sioux country; October—*fr.*
Scispus atrovirens, (Muhl.) With the preceding; July 24.

Scispus lacustris, (Linn.) Swamps and ponds in prairies; common; July 6.

Scispus triqueter, (Linn.) Swamps, Devil's lake; July 30.

Scispus maritimus, (Linn.) With the preceding; August 1. (β Torr., Mon. N. Amer. Cyp.) Borders of rivers and ponds in the prairies about Jacques and Shayen oju rivers; July 9.

Elocharis tennis, (Schulze.) Var., with the nut not verrucose; bristles, none. Muddy banks of Devil's lake; August 6.

Elorharis pymæa, (Torr., Mon. N. Amer. Cyp., l. c.) Var., nut without bristles. Borders of ponds in prairies of Jacques river; July 9.

Elocharis palustris. (R. Br.) Var. (?) small, cespitose, (2—6 inches;) glumes ovate-lanceolate, rather obtuse; bristles, 0 (?); style, 3-cleft; nut obovate, compressed, dull; tubercle conical, broad at the base, rather obtuse, one-quarter the length of the nut. Devil's lake; August 6.

Carex straminea, (Willd.) Swamps, Council Bluffs; May 14.

Carex arida, (Torr. and Schw.) Shady, fertile woods, Upper Missouri; October 20—*fr.*

Carex Sartwellii, (Dew., in Sill. Jour. 43, p. 90, t. cc., f. 95.) Swamps in prairies, Council Bluffs, May 22. Near *C. intermedia.* This species is common in the western part of the State of New York; it is also found in Indiana.

Carex cespitosa, (Linn.) With the preceding; May 7.

Carex lanuginosa, (Michx.) *C. Pellita*, (Muhl.) Sandy banks of the Missouri; May 26.

Var. *Minor.* Heads short; few flowered; with the preceding.

Carex granularis, (Schlz.) Valley of Shayen oju river; July 17.

Carex Pennsylvanica, (Lam.) Prairies, Council Bluffs; May 16.

Carex longirostris, (Torr.) Shady woods, Upper Missouri; June 10.

Carex lacustris, (Willd.) Prairies, Council Bluffs; May 20—July 6.

Carex Houghtonii, (Torr.) With the preceding; May 7.

GRAMINEÆ.

Alopecurus geniculatus, β *aristulatus*, (Torr.) Borders of swamps in prairies; July 6.

Panicum virgatum, (Linn.) Abundant on all the high prairies, but nowhere so luxuriant as near the Upper Des Moines river and Spirit lake; July 13.

Panicum capillare, (Linn.) Sandy plains, Shayen-oju river; July 26.

Stipa membranacea, (Pursh.) *Eriocoma cuspidata*, (Nutt.) Sandy banks of the Shayen river, Missouri; June 19.

Stipa sparti, (Trin.) *S. parviflora*, (Nutt., not of Desf.) No ticket with the specimens.

Stipa juncea, (Pursh, Nutt.) *S. capillata*, (Linn.—Hook.?) High and dry prairies between the Missouri and Mississippi rivers; July 14.

Urachne parviflora, (Trin.) *Agrostis miliacea*, (Linn.?) Differs in its more hyatine, and less distinctly 3-nerved glumes; but in other respects does not differ from the European plant. It is here noticed, for the first time, as a native of North America. Dry hills at the upper end of the Grand Detour, or the "Great Bend" of the Missouri.

Muhlenbergia glomerata, (Trin.) Prairies, Upper Missouri; July 13.

Muhlenbergia ambigua, (new species.) Panicle dense, opiciform; glumes rather unequal, (the inferior one shorter;) linear-lanceolate, very acute, 1—2 flowered; very hairy at the base; superior valve, with a bristle at the tip equalling it in length, a little shorter than the glumes, (exclusive of the awns;) superior floret, either perfect, and then resembling the inferior or rudimentary and aristiform. Stony banks of Okaman lake, Sioux country, September 20. Culms cespitose, about 1½ foot high, glabrous; leaves broadly linear; stipules very short, truncate, and lacerate; panicle 4—6 inches long; purplish; glumes tapering to a very acute cuspidate point, with a strong green midrib; perianth clothed at the base with whitish hairs, which are nearly half as long as the valves; valves nearly equal; awn a little tortuous, sometimes longer than the valve; superior floret often perfect, and maturing its fruit; when rudimentary, consisting of a mere awn, without any valve. A remarkable species, with the habit of *M. glomerata* and *M. Mexicana.*

Vilfa cuspidata, (Torr., in Hook. Fl. Bor. Amer. 2, p. 238.) Hills of the Missouri, near White river, and about Devil's lake; June 10—July 20.

Vilfa heterolepis, (Gray, in Ann. Lyc. New York, 4, p. 233.) Banks of Shayen river; August 12.

Agrostis Michauxii, (Trin.) Prairies between Jacques and Shayen rivers; abundant; July 6.

Agrostis cryptandra, (Torr., in Ann. Lyc., New York, 1, p. 151.) Banks of Spirit lake, Little Sioux river, &c.; September 30.

Calamagrostis stricta, (Nutt.) Dry swamps in the prairie of Shayen river; July 26.

Calamagrostis longifolia, (Hook., Fl. Bor. Amer., 2, p. 241.) Sandy plains and dry swamps, Jacques river; July 3.

Arundo phragmites, (Linn.) Common in all wet prairies and swamps between the Missouri and Mississippi rivers; July 26.

Spartina cynosuroides, (Willd.) Common in wet prairies; July 26.

Aristida pallens, (Nutt.) Arid situations, Upper Missouri; July 4—24.

Poa airoides, (Nutt.) Saline borders of Devil's lake; abundant; August 1.

Poa nemoralis, (Linn.) Shady woods and ravines, on the Missouri; June 6.

Poa crocata, (Michx.) Prairies of Devil's lake, &c.; July 18.

Poa eragrostis, (Linn.) Sandy plains, valley of the Shayen-oju river; July 27.

Catabrosa aquatica, (P. de Beauv.) Swamps, Devil's lake; July 31.

Kœleria cristata, (Pers.) High sandy prairies on the Missouri and Upper St. Peter's rivers; July 12.

Festuca tenella, (Willd.) Valley of the Upper Missouri; June 20.

Bromus purgans, (Linn.) Borders of woods; July 26.

Glyceria aquatica, (Smith, Trin.) Swamps about Devil's lake; July 30.

Glyceria nervata, (Trin. in Act. Petrop., 6, sec. 1, p. 365.) ***Poa nervata***, (Willd.) With the preceding.

Glyceria fluitans, (R. Br.) With the preceding.

Uniola stricta, (Torr., in Ann. Lyc., New York, 1, p. 55.) ***Brizopyrum spicatum***, (Hook., and Arn. Bot. Beech, p. 403, and Hook Fl. Bor. Amer., 2, p. 254, in part?) Hills of the Upper Missouri, June 1. I can hardly agree with my friend Sir William Hooker, in regarding this plant as a form of the ordinary *U. spicata*, so common on the Atlantic coast of the United States.

Triticum repens, (Linn.) Grassy banks of Jacques river, &c.; July 18.

Triticum caninum, (Linn.) Prairies between James (Jacques) and Red rivers; July 23.

Elymus Canadensis, (Linn.) Borders of woods, Devil's lake; August 3.

Elymus, (or a new genus between *elymus* and *hordeum*.) Spikelets, two at each joint of the rachis; one of which is 2, the other 3—4 flowered; involucre of 4—5 long setaceous glumes, which are entire; or, more commonly, very unequally 2-parted, (rather of 2 glumes united at the base.) Perianth 2-valved; valves lanceolate, scabrous; inferior 3-awned at the summit; the lateral awns ½—⅔ the length of the valve; middle one very slender—six times the length of the valve; superior valve with 2 short awns at the summit; culm about 15 inches high. Heavy ferruginous loam on the Missouri, Jacques, and Shayen-oju rivers; June 10.

Atheropogon aphidoides, (Muhl.—Torr. Fl., 1., p. 139.) Prairies of the Upper Mississippi, Devil's lake, &c.; July 2.

Atheropogon oligostachyum, (Nutt.—Torr. in Sill. Jour., 4, p. 58.) High prairies of the Missouri and Mississippi rivers; June 26.

Sesleria dactyloides, (Nutt.) Hills and valleys of the Missouri; June 6.

Lepturus paniculatus, (Nutt.) Heavy ferruginous soil, valley of the Upper Missouri; June 18.

Crypsis squarrosa, (Nutt.) Sandy situations in the valley of the Missouri, about Fort Pierre; June 28.

Beckmannia eruciformis, (Jacq.) Prairie swamps, near Jacques river; July 6.

Andropogon furcatus, (Muhl.) Swamps in prairies; July 6.

Andropogon scoparius, (Michx.) High prairies between the Missouri and Mississippi rivers; July 12.

FILICES.

Struthiopteris Germanica, (Willd.) Low woods on the Mankato river; abundant; September 20.

Polypodium vulgare, (Linn.) Rocks, Upper Mississippi; October 18.

Asplenium Rhizophyllum, (Linn.) With the preceding.

MARSILIACEÆ.

Marsilea vestita, (Hook and Grev., i c. fil. t. 159.) Dry swamps in the prairies near Devil's lake; July 24.

EQUISETACEÆ.

Equisetum hyemale, (Linn.) Low woods, banks of the Missouri and Upper Mississippi, May 21. Very large specimens, broken off at the top, and bearing a pair of small heads of fructification at two of the upper joints.

In the collection of Mr. Geyer, there were a very few specimens belonging to the lower orders of the *cryptogamia*, which I have not determined. They belong to the genera *hypurea agaricus*, (three or four species,) *hydrum*, *boletus*, *phellus*, and *chara*.

APPENDIX C.

List of Fossils belonging to the several formations alluded to in the Report; arranged according to localities.

[NOTE.—This list is not given as exhibiting all the fossils, nor even the most characteristic ones, that are found in the localities named. They were collected in the midst of other occupations, and are gathered together under one head, for the facility of reference, and as probably embracing more than have been brought together anywhere else.]

ST. LOUIS, (MO.,) AND ALTON, (ILL.)

Atrypa lingulata, (new.) Subfusiform; valves nearly equally convex; inferior valve with a longitudinal sinus; base projecting in the middle, the margin of the projection truncated. St. Louis, and also the bluff beneath Rockwell, Illinois.

Delthyris, (new.)
Cypricardites, (new.)
Echinodermata, spines of.
Retepora, (undetermined.)
Limestone upon which St. Louis stands, to the water-edge.

COAL FORMATION IN THE VICINITY OF ST. LOUIS.

Producta lobata. Rivière des Pères; Charbonière.
Turbinolia fungites.
Delthyris, (new.)
Pholadomya elongata, (Morton.)
Crinoideæ, several species.

ST. GENEVIEVE, (GABOURI CREEK.)

Bellerophon hiulcus; converted into red calcedony.
Producta (*hemispherica?* Sowerby.)
Turbinolia fungites.

Generally, the same fossils as those of the St. Louis limestone, but mineralized into calcedony.

DES MOINES RIVER, ABOUT RACOON FORK.

Producta punctata, (Sowerby,) and two new species.
Producta (undetermined)—large species.
Producta Margaritana, (Phillips.)
Turbinolia fungites.

RAPIDS OF THE DES MOINES.

Delthyris duplicostata, (*Spirifera duplicostata* of Phillips.)
Delthyris bisulcata, (Sow.)—allied to *spirifera*.
Delthyris spirifera, (*semicircularis* (?) Phillips.)
——— ———, (two new species.)
Producta punctata, (Sowerby.)
——— ———, (two new species.)
Crinoideæ.
Turbinolia fungites.

BURLINGTON BLUFF, IOWA.

Delthyris; large species, allied to *spirifer bisulcata*, and the same as that of the "Rapids Des Moines."
Delthyris, (undetermined fragment.)
Producta hemispherica (?)—(Sowerby.)
Orthis; small, unknown species.
Strophomena; impressions of a small species.
Crinoideæ, (undetermined.)

MINERAL REGION OF WISCONSIN TERRITORY—GALENA AND ITS VICINITY.

Blue limestone, (Dr. Owen and Dr. Locke.)

Trilobites:—

Illænus, (new.)
Asaphus, (new.)
Ceraurus pleurexanthemus, (Green.)
Portion of an isotelus gigas.
Calymene spinifera, (Conrad.)
} Trenton limestone, New York, corresponding with the lower part of the caradoc—perhaps still lower.

Shells.

Strophomena, (new.)
Strophomena sericea, (Sowerby.)
Strophomena alternata (?)
Orthis alternata (?)
} Same of the Trenton limestone, N. York.
Orthis callactis.
Cypricardites, (new.)
Trochus lenticularis, (Sowerby.) Murch. Sil. Syst.
Pleurotomaria.
Bellerophon bilobatus.
Orthoceras, (one species, large.)

Cliff limestone.

Illænus, (new.) Same species as in the Trenton limestone.
Strophomena delthoidea.
Atrypa, (new species.)
Lingula, (new.) Same with a Trenton limestone species.
Euomphalus, (new.)
Orthoceras; fragment, (undetermined.)

Corals.

Cyathophyllum ceratites (?).
Turbinolopsis, (new.)
Favosites, (new.)
Portion of an asterea (?).

ST. PETER'S AND FALLS OF ST. ANTHONY.

Strophomena, allied to *S. alternata.*
Strophomena, (new species.)
Orthis testudinaria? (Murch. Sil. Sys., pl. 20, fig. 10.)
Orthis polygramna? (Murch. Sil. Sys., pl. 21, fig. 4.)
Orthis, (three new species.)
Stenoscisma, resembling *Terebratula Schottheimii,* (Dalman.)
Atrypa, (new species.)
Pleurotomaria, (new species—numerous.)
Euomphalus, allied to *Maclurites magna,* (Des.)
Euomphalus, resembling *E. sculptus,* (Sowerby.)
Phragmolites, same as the Trenton limestone, N. Y.
Phragmolites, (new species.)
Bellerophon bilobatus.
Orthoceros, (two species, undetermined.)
Crinoideal remains of peculiar forms; one resembling *lipocrinites.*
Turbinolopsis bina? (Silur. Syst., pl. 16 bis., fig. 5.)
Favosites lycopodon, (Say.) Trenton limestone fossil.
Favosites, (two new species.)
Fucoides, (obscure.)
Cyathophyllum ceratites?
Turritella.

FIVE-BARREL ISLANDS, ON THE MISSOURI.

Pholadomya elongata, (Morton.) Found in the rubbish.
Producta lobata.
Euomphalus, in the blue slaty limestone.
Cyathophyllum vermiculare, of Goldfass.
Crinoideæ, remains of.

FOSSILS OF THE CRETACEOUS FORMATION.

On the Missouri river.

Inoceramus Barabini? (Morton.)
Scales of a fish.

In the calcareous marl.

Orbicula, imperfect specimen.
Ostrea congesta, (Conrad.)*

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* *Conrad's description of the ostrea congesta:* Elongated; upper valve flat; lower valve ventricose, irregular; the umbo truncated by a mark of adhesion; resembles a little *gryphea-vomer* of Morton.

Ammonites placenta, (De Kay.) Very large; found also in New Jersey.
Ammonites Mandanensis, (Morton.)
Ammonites Nicolletii, (Morton.)
Ammonites abyssinus, (Morton.)
Ammonites Conradi, (Morton.) Also found in Alabama.
Baculites ovatus, (Say.) Also found in Alabama.
Baculites compressus, the same species flattened.
Belemnites mucronatus; found in New Jersey and Alabama, and also occurs in the chalk of England.
Hipponyx borealis, (Morton.)
Avicula cretacea, (Conrad.)*
Cytherea Missouriana, (Morton.)
Tellina occidentalis, (Morton.)
Ostrea vesicularis, (Lamarck.)
Anomia tellinoides, (Morton.)
Inoceramus Barabeni, (Morton.) Occuring in great numbers, and of unusually large size; most frequently compressed. This species approaches *I. Crispii* of Mantell, figured in his Geology of Sussex, and characterizes the formation.

VERTEBRATED ANIMALS.

Two vertebræ of a species of squalus.
Three vertebræ of a nondescript crocodile.
Two vertebræ continuous of an animal belonging to the order of *enalis saurus*, of Conybeare. The specimens are completely mineralized, the organized structure being entirely replaced by crystallized carbonate of lime. From the size of the specimens, and their other characters, it is quite probable that these vertebræ form a part of the skeleton of the *saurocephalus lanciformis*, (Harlan.) Vide Medical and Physical Researches, pp. 362 and 386. These specimens are considerably distorted by pressure, and similar ones have been found in the green sand of New Jersey, and in the chalk formation of England.

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* This is a fragment of a cast, but sufficiently distinct to entitle it to a specific appellation. It is remarkable for the perfectly rectilinear front margin, so far as it appears on the fragment.